Delhi Sustainable Development Summit 2001

Poverty

the global challenge for governments, industry, scientists, and civil society

Delhi Sustainable Development Summit 2001

Poverty: the global challenge for governments, industry, scientists, and civil society

(Proceedings of the conference held from
7 to 9 February 2001 in New Delhi, India)

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Preface

Poverty: the global challenge for governments, industry, scientists, and civil society ix–x

Significant developments often occur in the absence of careful preplanning and preconceived actions. In the year 2000, TERI celebrated its silver jubilee as an Institute, when it was decided to stage a major event where a number of distinguished leaders from every profession would be invited to focus on the theme of global sustainable development, particularly as the world was entering the new millennium. The response to invitations for a series of short conferences that were organized by TERI on that occasion was extremely heartening and the result was a global event where profound ideas and rich deliberations came to the surface. Among those who participated were Nobel laureate, Prof. F Sherwood Rowland; Prof. James Gustave Speth, Dean, School of Forestry and Environmental Studies; Sir Mark Moody Stuart KCMG, Chairman, Royal Dutch/Shell Group of Companies; Dr Nitin Desai, Under-Secretary-General, United Nations; Prof. Klaus Töpfer, Executive Director, United Nations Environment Programme; and Dr Mohamed T El-Ashry, Chief Executive Officer and Chairman, Global Environment Facility. The celebrations themselves were inaugurated by the Hon'ble President of India, Mr K R Narayanan, and the final session had world leaders like former Prime Ministers – Mr Ryutaro Hashimoto of Japan, Mr Ola Ullsten of Sweden, and Mr I K Gujral of India – as well as Mrs Sheila Dikshit, Chief Minister of Delhi, Mr Robert S McNamara, former President of the World Bank, and Dr Manmohan Singh, former Finance Minister of India. Several of those who participated in the Silver Jubilee celebrations of TERI suggested that the success of that event justified an annual gathering of the same stature to be organized by TERI, since there was now a demonstrated interest on the part of very important persons from all over the world to address the challenge of global sustainable development and to travel for this purpose to New Delhi, the capital of the world's largest democracy. Thus was born the Delhi Sustainable Development Summit.

TERI took up the challenge and organized the first Summit in February 2001 at which it was a privilege to have the Hon'ble Prime Minister of India, Mr Atal Bihari Vajpayee, as the Chief Guest for inaugurating the event. The conference itself was attended by a distinguished set of speakers and participants providing a very high level of professional expertise and rich fare of stimulating discussions and insights that are of relevance to the future of this planet and the human race, which through its actions and interventions has created a situation where the climate system of the earth is in peril, the rich biodiversity that has sustained nature's cycle of existence has been disturbed, and all of the earth's natural resources are in a state of imbalance. Perhaps never before has the human race faced a greater challenge and never before has there been a greater need for a common understanding and cooperation among all the people in this world. Action to correct the ills imposed by human intervention on the good health of the earth must, however, be preceded by careful introspection, rigorous intellectual endeavour, and the detailing of plans that can achieve the maximum results with the minimum expenditure of resources. DSDS 2001 is a small effort in providing the intellectual base for action and a spark by which the light of human wisdom and understanding can be lit for a brighter future.

My colleagues at TERI and I believe that it is essential to spread the message that came out of this unique gathering of enlightened persons and their discussions and interactions guided by a common objective. The second Delhi Sustainable Development Summit is due to be held in February 2002 and a much larger global event, the WSSD (World Summit on Sustainable Development), is scheduled to be held in Johannesburg in September 2002. This volume would be a timely and useful input for those concerned with the WSSD process and to every citizen who justifiably has fears about the future of this planet and the species that the planet has created and supported for millions of years. These proceedings, therefore, are a humble offering to those dedicated to a sustainable and peaceful future, and who see in the current trend of unsustainable development the seeds of destruction of all that is precious for all forms of life on earth.

(R K Pachauri)
Director-General, TERI

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Those from TERI mentioned in the accompanying table coordinated the publication of the proceedings and acted as resource persons or rapporteurs.

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Inaugural session	Mr Saif Hyder Hasan Ms Anuradha Vashist
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Poverty and sustainable development	Ms Rekha Krishnan Ms Divya Datt
Science, technology, and enterprise development for the poor	Mr Prosanto Pal Ms Pooja Mehrotra
Corporate social responsibility and poverty alleviation	Ms Vandana Bhatnagar Mr Amit Soni
Effective governance and communications for promoting sustainable development	Ms Richa Mishra Bhasin Mr Sanjay Gupta
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Energy for the masses	Mr Rahul Deep Singh Ms Shilpi Banerjee

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Keynote address 7 (Dr Karan Singh)	Ms Shilpa Malik
	Ms Pooja Manchanda
All lunch/dinner addresses	Dr Vani J Shanker
	Ms Jaishree Ram Mohan
	Ms Dhenuka Srinivasan
	Ms Rashmi Bajaj
Closing session	Mr Yateendra Joshi
	Ms Preeti Malhotra

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Theme presentation

R K Pachauri
Director-General, TERI, New Delhi, India

Poverty: the global challenge for governments, industry, scientists, and civil society 3–6

Poverty is not merely income-related, for according to Prof. Amartya Sen,[1] it is deprivation of basic capabilities, and could include several factors that are essentially deficiencies in the human condition.

We are living in a world, which has seen unprecedented growth during the last 50 years. Unfortunately, at the same time, the magnitude of poverty has increased manifold. Therefore, we are in a rather unequal world where consumption, income, and wealth are distributed in a rather skewed fashion. For instance, the US, Japan, and other high-income countries with 15% of the world's population consume half of the world's commercial energy. This is symbolic of the distortion in consumption for various other goods and services as well.

We cannot possibly follow blindly the path that has been set by the North; we have to define our own agenda and take into account the massive problem of poverty that developing countries face. The North–South divide can be described in terms of the following characteristics. The North basically focuses on income and local environment and the South must consider social, cultural, and political dimensions while defining sustainability. When confronted by a British journalist who asked, 'Wouldn't you, Gandhiji, want India to be as prosperous as Britain?', Mahatma Gandhi said, 'It took Britain half the resources of the planet to achieve this prosperity. How many planets will a country like India require?'

The nexus between poverty, environment, and sustainable development is clear. Resource and environmental degradation lead to an impact on poverty; the poor incidentally are totally dependent on natural resources around them. Therefore, economic growth, at least as far as this section of society is concerned, is deeply influenced by the condition of natural resources on the earth.

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[1] A distinguished economist, best known for his work on poverty and famine, Prof. Sen was awarded the Nobel Prize for Economic Sciences in 1998 in recognition of his contributions to welfare economics, including the axiomatic theory of social choice, definitions of welfare and poverty indexes, and empirical studies of famine. Prof. Sen is the Master of Trinity College, Cambridge, before which he has been Professor of Economics and Philosophy at Harvard University and held professorships at Oxford University, UK; Delhi School of Economics, India; and Jadavpur University, India.

It is also unfortunate that the poor are highly vulnerable to environmental disaster. We have seen a grim and tragic reminder of this with the earthquake[2] that took place in Gujarat just a few weeks ago, and also the cyclone[3] that occurred in Orissa a little more than a year ago. Also, we need to be worried about the impacts of climate change in the future, because the developing countries would be the worst sufferers of the impacts of climate change. One estimate being developed by the IPCC (Intergovernmental Panel on Climate Change) shows that as a consequence of climate change while the US would suffer a loss of 0.5% of the gross domestic product during this century, India would suffer a loss of about 5%—almost 10 times more. Water stress and scarcity will have an impact on the lives of the poor. Natural disasters will hit us badly simply because we lack the technological capacity and the infrastructure for mitigation.

Lessons from the Gujarat earthquake clearly reveal the lack of regulation and local knowledge on building safety. The weakness in enforcement of some of these regulations is also a major factor. Poverty and paucity of equipment go together; if we had the kind of equipment that can be mobilized in other parts of the world, we perhaps would have saved a lot of lives. We need resources for rehabilitation. TERI is trying to develop a plan with the Gujarat Electricity Board whereby we will provide energy to the villages in Gujarat quickly by the use of renewable resources, as it will take long to restore all the damaged electricity lines.

We are all stakeholders in this enormous challenge for removing poverty from the face of this earth. It is laudable that actions are being taken by the Government of India to implement poverty eradication measures. Industry has a major stake also, because there are vast untapped market opportunities. The poor, despite their condition, do spend money for things that are of benefit to them. Unfortunately, the corporate sector has not given this issue the attention it deserves. Reasons of social responsibility and long term business interests require the corporate sector to view poverty as a major opportunity. Another set of stakeholders, scientists cannot possibly get the

[2] The earthquake that shook the Indian Province of Gujarat on the morning of 26 January 2001 is the most deadly earthquake to strike India in its recorded history. The official figures placed the death toll at 19 727 and the number of injured at 166 000.

[3] Termed as one of the most devastating human disasters ever experienced, this supercyclone hit Orissa in the early hours of 29 October 1999 killing thousands and displacing millions. The official number of deaths is reported to be nearly 10 000. Apart from significant loss of human and animal life, the cyclone damaged over 1 000 000 houses, and many hectares of agriculture land and considerable amount of infrastructure.

sanction of society to do whatever they want today. They must address the challenge of development and establish the relevance of scientific research to societal needs. As far as non-governmental organizations and civil society are concerned, poverty removal is clearly the reason for their existence. The international community has to enhance capital and knowledge flows, including technology. It must also facilitate solutions and development models of success that can be replicated. There is a need to mitigate global environmental stress. The fact that the Kyoto Protocol[4] has still not come into existence is a sad reflection of the sense of responsibility that the global community obviously lacks. We need globalization that is pro-poor, has a human face, and is socially responsible. I would like to refer to the recent address of the US former president Mr Bill Clinton. He said, 'The great question before us is not whether globalization will proceed, but how. And what is our responsibility in the developed world to try to shape this process so that it lifts people in all nations'. We need to fashion that 'how' in a manner such that the poor are not left out of the process.

National governments must establish adequate social security systems. Environmental resource management must become an important part of economic decision-making; we need to be more concerned about the natural debt than the national debt. We are borrowing heavily from nature without accounting for it. Such accounting should become part of our economic decision-making. We need participative governance at all levels.

Industry has to promote responsible resource management. It cannot enlarge its footprint on the earth by consuming more and more resources to produce the same goods and services. It must develop efficient technologies whereby resources are conserved and must develop markets for services, which also look at the needs of the poor. There is need also for developing income-enhancing inputs for the poor. Our R&D priorities and the products we make cater only to middle- and high-income consumers. Attention must be focused on the needs of the poor; they must be treated as part of the market opportunities that lie ahead.

In an eloquent statement at the National Science Congress of 2001, the Hon'ble Prime Minister of India, Mr Atal Bihari Vajpayee said, 'Of the many forces that will shape human history in the new millennium, science and technology will, perhaps, be the most potent'. We, therefore, need to promote goal-oriented and people-friendly technology development. There must be clear-cut goals and time schedules by which we develop technologies that focus on environmental solutions and enhance land productivity. Accountability systems must be in place. Scientists cannot continue to receive blank cheques for whatever they do. The role of civil society is to promote information dissemination, education, disseminate technological solutions for the benefit of the poor, build capacity through strengthening local institutions, and involve the media in a more proactive fashion than has been the case in the past.

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[4] The Protocol, drafted during the Berlin Mandate process, that, on entry into force, would require countries listed in its Annex B (developed nations) to meet differentiated reduction targets for their emissions of a 'basket 'of greenhouse gases relative to 1990 levels by 2008–12. It was adopted by all Parties to the Climate Convention in Kyoto, Japan, in December 1997.

TERI has been heavily involved in environment-friendly energy solutions, an example of which is the RETREAT (Resource Efficient TERI Retreat for Environmental Awareness and Training) building, which was inaugurated by the Hon'ble Prime Minister in July 2000. We are also developing biotechnology solutions that focus on the poor. We are active at the global level on issues of climate change. We want to focus on technology for removal of poverty also, an issue that has not received the kind of attention it deserves. The technological changes that are taking place make it possible for us to take renewable energy technologies, information technology, and biotechnology in a user-friendly fashion to illiterate farmers and the rural poor. India must develop people-oriented poverty eradication schemes. There is a need to promote and develop micro-finance institutions; we have to give substance to the 73rd and 74th constitutional amendments. May I request that in the annual economic survey, we include a chapter on sustainable development and the state of the environment? This is critical for ensuring that environmental issues and sustainable development become mainstream as far as economic decision-making is concerned. India has to take a more proactive role in the negotiations on climate change and, in this effort, the government must involve external institutions. Climate change is a global problem that will hit us badly. India has to show its commitment and mobilize public opinion all over the world to see that the right actions are taken.

Welcome address

A Ramachandran
Chairman, TERI, New Delhi, India

Poverty: the global challenge for governments, industry, scientists, and civil society 7–8

The Delhi Sustainable Development Summit was conceptualized during TERI's silver jubilee celebrations in February 2000 and there are several reasons why it must be organized on an annual basis. First, the 21st century has to be the century of knowledge and science. We are living in a period of unprecedented change and it is essential to constantly review our knowledge and disseminate it effectively, particularly as it applies to decision-making in the field of development. The patterns of development pursued by the North and being largely pursued by the South are clearly unsustainable. In the preoccupation with economic growth, we have ruined the quality of air, water, and soil around the globe and have degraded our natural resources to such an alarming extent that future generations will never forgive us. We need strength and power of new ideas to change all that is wrong with current patterns of development and to formulate strategies and policies that are sustainable. Eradication of poverty must rank as the top priority for India today. With more than 50 years behind us as an independent nation, it is now unacceptable that so many citizens continue to live under conditions that give them no more than basic survival and subsistence, or that they are so vulnerable to disaster and disease, man-made or natural, as has been recently demonstrated rather vividly in Orissa[1] and Gujarat.[2]

The forces of globalization will inevitably take us to a more open, liberal, and market-based economy, which will certainly be welcomed by many in our country. However, while participating in the global economy to our own advantage, we must be competitive, both as producers and as consumers. In an economy where the basic factor of production – labour – is grossly underutilized and undervalued, neither the production capacity nor the purchasing power can ever be built up to levels that make the economy competitive with other nations.

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[1] Termed as one of the most devastating human disasters ever experienced, this supercyclone hit Orissa in the early hours of 29 October 1999 killing thousands and displacing millions. The official number of deaths is reported to be nearly 10 000. Apart from significant loss of human and animal life, the cyclone damaged over 1 000 000 houses, and many hectares of agriculture land and considerable amount of infrastructure.

[2] The earthquake that shook the Indian Province of Gujarat on the morning of 26 January 2001 is the most deadly earthquake to strike India in its recorded history. The official figures placed the death toll at 19 727 and the number of injured at 166 000.

Technology has a large role to play in this effort but it must be technology of a different type geared to the needs of people as consumers and to their skills and potentials as producers. More important, India must fortify its institutions for innovations, not only in the public sector but even more in the private and non-governmental sectors. Much higher priority must be given to R&D directed at technologies and production systems that have a direct impact on the vast majority of the populace. Much work needs to be done to strengthen and create new institutions that address the entire value chain from innovation to the delivery of goods and services needed to eradicate poverty. Starting with their needs and with the economic multipliers possible, such areas as housing, water, and energy offer huge and swift impacts to both accelerate economic growth and spread its benefits more widely throughout the population.

TERI, as an institution committed to all aspects of sustainable development, has a major responsibility in continuously providing knowledge and stimulating debate on various aspects of sustainable development. We would like to see India emerge as a shining example of welfare, not only for the present generation but also for generations yet to come. It is also time that India persuades those countries that are responsible for polluting the global environment to mitigate this enormous problem. It is our endeavour that we work with our own government, responsible members of civil society, international organizations, the corporate sector, non-governmental organizations, and the media.

It was Mahatma Gandhi who said, 'be the change you want to see in the world'. In that spirit, TERI has endeavoured to fully practise what it preaches. TERI does not receive any recurring grants from any source but generates all its resources through its activities and the support they attract. Through its own efforts, the Institute even finances its expansion in a major way. Today, TERI is not only a national institution but truly a global organization with a formal presence in the US and Europe, and staff located in the Middle-East, Central Asia, Russia, and Japan. Within the country, TERI has centres in Bangalore, Goa, and Guwahati, apart from its headquarters in New Delhi and the training campus in Gurgaon, Haryana.

I am delighted that this summit has attracted luminaries and distinguished leaders from all over the world, which we accept as an expression of appreciation for TERI's mission and activities, and a commitment on the part of the global community to the issues central to the Delhi Sustainable Development Summit 2001.

Statement

Mark Malloch Brown
Under-Secretary-General and Administrator, United Nations Development Programme, USA

Poverty: the global challenge for governments, industry, scientists, and civil society 9–10

On behalf of the UN (United Nations) Secretary-General, Mr Kofi Annan, and all at the UN family, I would like to express sympathy to India for the terrible tragedy in Gujarat.[1] While an earthquake is unavoidable being a natural disaster, the consequences are evidently multiplied by issues of poverty and environmental degradation. It is a solemn challenge to recognize the vulnerability of India to natural disasters and the importance of mitigating its effects.

The United Nations Development Programme is proud to participate in this extraordinary gathering of public, private, and civil society partners organized by TERI. The ideas, the resources, and the political will in evidence suggest that we can rebuild the coalition for sustainable development and for an assault on the environmental crisis we collectively face.

The track record in the 10 years since Rio[2] has been mixed. Mr Maurice Strong, President, United Nations University of Peace, has been a champion of the Rio Summit and its follow-up. Along with all those who participated in Rio, he put the environment on the world map in 1992. However, in the last few years, in some ways, we lost the way. It was so striking to those of us in the UN Secretariat involved in the Millennium Summit in New York in 1998, that we had to remind governments of the importance of references to the environment. We had seen, first in Kyoto and then in The Hague, that we were losing our way in terms of a powerful North–South coalition around the issues of an environmentalism for all. We were seeing the argument break up due to the South being suspicious that the environment was becoming a new trade weapon and in the North the fear that the bill for environmental improvement was being put solely at their door.

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[1] The earthquake that shook the Indian Province of Gujarat on the morning of 26 January 2001 is the most deadly earthquake to strike India in its recorded history. The official figures placed the death toll at 19 727 and the number of injured at 166 000.

[2] Another name for the United Nations Conference on Environment and Development, the Earth Summit was held during 3–14 June 1992 in Rio de Janeiro, Brazil. It was a culmination of international concern on the global environment, providing an opportunity for many heads of state to reach consensus on promoting sustainable development by integrating the linkages between environmental, economic, social, and development priorities. The Summit attracted over 100 heads of state and 20 000 persons from non-governmental organizations and related professional groups. It produced the following three documents and two treaties—the Rio Declaration on Environment and Development; Agenda 21; the Statement on the Sustainable Management of the World's Forests; the Convention on Biological Diversity; and the Framework Convention on Climate Change.

This summit in India such a populous developing country allows us the opportunity to reassert the importance of an environmental approach based on sustainable development and poverty reduction. It espouses an environmental stand, which, far from embracing a 'no growth' position, adopts the importance of growth for the poor: growth that draws the poor into an energy economy which is not based on depleting the environment around them.

Keynote address

Maurice Strong
President of the Council, University for Peace, Costa Rica

Poverty: the global challenge for governments, industry, scientists, and civil society 11–14

I am deeply honoured to have this opportunity of returning to New Delhi where I have been coming under different but always important and interesting circumstances for many years. We are today amongst illustrious company to participate in this landmark conference on sustainable development and its relationship to poverty. My regret is that this visit has been darkened by the shadow of the catastrophic earthquake,[1] the effect of which will leave wounds on India and neighbouring areas for years to come. However, it seems to have already galvanized the spirit of India that has, for years, demonstrated its capacity to overcome tragedies and problems and move on. On the other hand, it is an auspicious occasion as well. India has passed through many milestones including the 53rd anniversary of its independence and the birth of its billionth citizen. I am delighted to have been invited to speak in this summit and to renew my association with TERI. I have been an immense admirer of TERI, which is a great asset for India, and one of the foremost institutions of its kind in the world.

I have also long been an admirer of India and the pivotal role this country has played in moving the global environment and development agenda forward by linking it to issues of hunger, poverty, and population—issues central to the concerns of developing countries. The presence of the Hon'ble Prime Minister of India is an immensely encouraging evidence of its leadership's deep interest in the cause of sustainable development as an indispensable instrument for overcoming hunger and poverty issues in India.

The issues concerning sustainability emerged onto the world stage in 1972 in Stockholm,[2] were revisited by the Brundtland Commission,[3] and then addressed at the Earth Summit[4] in Rio in 1992. The lack of progress in implementing the agreements reached at Rio may be disappointing but there have been some positive developments, which give us something on which to build the future. I want to commend India for its key role right from Stockholm, where its position was central to placing the concerns of all developing countries on the map and turning it from a pollution conference into a conference on environment, development, and relief from poverty. Indians have been in the forefront, at home and abroad, of the technological revolution that is driving the new global economy. The Confederation of Indian Industry[5] has demonstrated its leadership in bringing the sustainable development message to its members. Positioned as one of the major players, India seems set to prove the economists right in their projections—India is destined to become the fourth largest economy in the world in the next 15 years or so. Yet, India continues to grapple with problems of deeply-entrenched poverty and the challenge of ensuring that its millions of poor and under-privileged share equitably in the benefits of the new economy. The 21st century will be decisive for the human species; the direction and fate of human life on this planet will probably be set by what we do or fail to do in the first three decades of this century.

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[1] The earthquake that shook the Indian Province of Gujarat on the morning of 26 January 2001 is the most deadly earthquake to strike India in its recorded history. The official figures placed the death toll at 19 727 and the number of injured at 166 000.

[2] Held during 5–16 June 1972 in Stockholm, Sweden, the United Nations Conference on Human Development was the first global effort to place the protection of the biosphere on the official agenda of international policy and law. It was the first global environmental conference held by the United Nations.

[3] Another name for the World Commission on Environment and Development, a UN agency

In 2002, in Johannesburg, South Africa, world leaders will meet again to mark the 10th anniversary of the Rio's Earth Summit and the 30th anniversary of the Stockholm conference. These are ominous signs that this could serve to dramatize the failures and shortcomings of the past three decades, rather than to celebrate the significant progress that has been made. For example, the regrettable impasse in the negotiation agents of the climate

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commissioned in 1983 to assess global development and associated social and environmental problems. Headed by the then Prime Minister of Norway, Dr Gro Harlem Brundtland, the Commission conducted public hearings throughout the world during 1983–87 to review the concept of sustainability. In the Commission's unanimous report (Our Common Future) was coined the world's best-known definition of sustainable development as 'development that meets the needs of the present, without compromising the ability of future generations to meet their own needs'.

[4] Another name for the United Nations Conference on Environment and Development, the Earth Summit was held during 3–14 June 1992 in Rio de Janeiro, Brazil. It was a culmination of international concern on the global environment, providing an opportunity for many heads of state to reach consensus on promoting sustainable development by integrating the linkages among environmental, economic, social, and development priorities. The Summit attracted over 100 heads of state and 20 000 persons from non-governmental organizations and related professional groups. It produced the following three documents and two treaties—the Rio Declaration on Environment and Development; Agenda 21; the Statement on the Sustainable Management of the World's Forests; the Convention on Biological Diversity; and the Framework Convention on Climate Change.

[5] The CII (Confederation of Indian Industry) is an industry-led and industry-managed organization working to sustain an environment conducive to the growth of industry in India. It has the direct member-

change convention[6] and the prospect of failure of some of the leading industrial nations to meet even the modest targets for reduction of carbon dioxide emissions. Official development assistance has declined despite the agreement in Rio that new and additional financial resources must be made available to developing countries to support their transition to a sustainable development pathway. There is evidence that despite progress in many specific areas, overall the global environment continues to deteriorate while the forces that drive it – population growth (in developing countries) and wasteful patterns of production and consumption (in industrialized countries) – continue unbridled. This unpromising scenario can be turned into an historic opportunity to revitalize the momentum generated by Stockholm and Rio. What future occasion will give us such an opportunity to produce a new global compact for a sustainable future, building on the knowledge and experience we have acquired since Stockholm? There have been immense advances in developing and improving environmental technologies. There are many positive examples demonstrating that sustainable development is not only feasible but is also the best and the only durable way of overcoming poverty and generating economic growth that will serve the interests of all society. The primary focus of such efforts must be on ensuring the sustainability of ecosystems and resources on which the poor depend. We must make the poor beneficiaries of sustainable development rather than the main victims of our failure to achieve sustainability. Stockholm initiated and Rio gave new impetus to our awareness of the processes, which we know are so damaging to our prospects for a sustainable future.

We have lost our innocence; we now know that we are going to damage the basis for our own future. However, we also know how to change the self-destructive course we are on. Yet, we still have not changed course. Why is this? Implementation depends on motivation, which is the central issue. At the deepest level this is rooted in our moral and ethical values. We will not do the things that we know we must do without a significant shift in the moral

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ship of over 3900 companies from the private as well as public sectors and indirect membership of 40 000 companies of over 100 sectoral associations. Gaining from institutional partnerships with 191 counterpart organizations in 92 countries, the CII serves as a reference point for Indian industry and the international business community.

[6] The United Nations Framework Convention on Climate Change is a treaty signed at the 1992 Earth Summit in Rio de Janeiro by more than 150 countries. Its ultimate objective is the 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system'. While no legally binding level of emissions is set, the treaty states an aim by Annex I countries to return these emissions to 1990 levels by the year 2000. The treaty took effect in March 1994 upon the ratification of more than 50 countries; a total of over 180 nations have now ratified it.

and ethical basis of our behaviour, and in our politics and societies. This concept is integral to Gandhian philosophy and draws very much upon Indian values and experience. It used to be thought that spiritual and ethical imperatives are divorced from the real world. But today, moral and ethical imperatives which once were thought to be somewhat unrealistic and idealistic are now not just pious ideals but basic indispensable prerequisites for our survival and well-being.

The Delhi Sustainable Development Summit comes at a pivotal time. It can significantly influence the results of the 30th and 10th anniversaries of Stockholm and Rio, respectively. This summit has a profound opportunity because it is based on Indian leadership and initiative to shape the course of the sustainable development path on which Stockholm and Rio were launched. We must revitalize it in Johannesburg. It is an historic opportunity we cannot afford to miss.

Inaugural address

Atal Bihari Vajpayee
Prime Minister of India, New Delhi

Poverty: the global challenge for governments, industry, scientists, and civil society 15–18

I am happy to be with all of you at this important summit on sustainable development. I am gratified by the presence of many eminent participants representing both developed and developing countries, besides senior representatives of key international organizations and NGOs (non-governmental organizations). I congratulate TERI for three praiseworthy features of the summit. First, the DSDS (Delhi Sustainable Development Summit) seeks to amplify the voice of developing countries in the worldwide debate on sustainability. Second, the main theme is poverty eradication, which is also the core issue that globalization must address. Third, the organizers recognize that poverty is a global challenge not only for governments but also for industry, scientists, and civil society as a whole.

The past decade was marked by two landmark events. The Earth Summit at Rio de Janeiro in 1992 placed sustainable development on top of the global agenda. Never before had the world community acknowledged so powerfully that development must either be sustainable or should not be called development at all. Three years later, in 1995, the World Trade Organization came into being, formalizing the advent of a global market. Ever since, the debate on globalization and sustainable development has grown both in dimension and dynamism. There is an increasing awareness that only concerted and coordinated global action can meet the challenges of poverty alleviation, environment protection, and balanced development. For meaningful and effective global action, we must first recognize the magnitude of global inequities. The World Bank indicates that one-sixth of the world's population receives 78% of the world's income, which amounts to 70 dollars a day. Simultaneously, three-fifths of the world's people, living in the poorest 61 countries, receive only six per cent of the world's income, which is less than two dollars a day.

As the age of globalization dawns upon us, several stark facts about global poverty stare at us in the face. The percentage of people living below the poverty line may have come down in several countries as it has in India. However, the relative gap between the rich and the poor has widened, both within and amongst nations. The benefits of technology, trade, and other opportunities presented by globalization have spread unevenly. Consequently, the rate at which poverty is being eradicated has not kept pace with the rate at which the rich are getting richer.

It is equally clear that poverty can no longer be seen exclusively in static income terms, what matters more than income levels is the access, or lack of it, to entitlements and opportunities for a happy life. Deprivation of normal family and community relationships, and lack of opportunities to advance one's own cultural life, have also become important features of poverty in modern times. For example, an urban migrant worker living in an inhuman and impersonal slum may earn more than what he was when living in a village in a harmonious social and cultural milieu but he cannot be considered to be living a better and more fulfilling life.

Both the magnitude and the changing meaning of poverty have made one thing clear—poverty cannot be removed by the traditional strategy of income enhancement of all in the simplistic hope that higher incomes will naturally buy all the necessary entitlements. Consumerism of the super-rich has become a curse for the global environment. We can hardly hope to eradicate poverty and achieve sustainable development by globalizing this course. It is impossible for the lifestyles of rich nations to be replicated all over the world without putting enormous pressure on the earth's limited resources.

Just as we have become more aware of the meaning of poverty, so too have we become more sensitive to the meaning of development. An increasing number of people around the world are wondering whether we are losing sight of man and his deeper aspirations in the one-dimensional race for economic growth. Industrial civilization has led to unprecedented levels of material wealth. At the same time, it has also brought about the unprecedented imbalance between material and psychological affluence. The world community cannot be blind to the implications of this imbalance. Therefore, in the new century, the world needs to put more emphasis on the realization of new lifestyles driven by a set of values that prioritize compassion, cooperation, care of the environment, and joy of living.

All of us are aware that a narrowly-focused economic model can neither remove global poverty nor yield sustainable development. Yet, we cannot belittle the importance of restructuring the economic relations between and within countries. What we need is a comprehensive and holistic global strategy, which involves the fullest mobilization of all economic, sociocultural, and technological resources. There is a need to substantially increase the resources of governments in developing countries to pursue developmental projects and programmes aimed specifically at poverty eradication. The resources of multilateral and bilateral development agencies also need to be significantly enhanced. This calls for a far higher level of political will in industrialized countries than is manifest today. Developed countries, in particular, must cooperate in speedy conclusions of the international agreements on climate change.

It is high time that we considered imposing an international levy on capital flows between developed countries, and all capital repatriations from developing countries. The proceeds may be credited to a global poverty alleviation fund, which could have the following objectives.

1 The accelerated liquidation of all public external debts of low-income countries
2 Poverty alleviation programmes specifically targeted at those who have lost their livelihoods in economic crises brought about by reversal of external capital flows in developing countries
3 Enhancement of skills and increased access to finance needed by the poor to compete effectively in the global economy
4 Placing technologies that save lives, increase food yields, generate renewable energy for rural areas, and facilitate adoption of clean production in the public domain for use by the developing countries

Technology, especially IT (information technology) has created a massive growth in productivity. It has also proved to be a revolutionary tool for education, health care, and sustainable development. However, unequal access to IT has given rise to legitimate fears of a 'digital divide'. We need collective global action to speedily bridge the gap between IT-haves and have-nots. In this context, India is ready to offer expertise to others. We are also willing to learn from successful experiences elsewhere.

There is also a need for greater global cooperation to deal with natural calamities, especially in developing countries. In natural calamities, the poor always lose much more proportionately than the rich. Information and critical technologies that can prevent disasters, contain their damage, and help in better management of relief, rehabilitation, and reconstruction should be available to all countries. In this context, I gratefully acknowledge the generous help that India has received from the international community after the recent devastating earthquake in Gujarat.

TERI has brought out an excellent publication called *DISHA (Directions, Innovations, and Strategies for Harnessing Action) for Sustainable Development*, which focuses on green technologies, the use of market-based instruments, a new code of ethics for the corporate sector, and effective governance at all levels. As the book persuasively argues, government, civil society, research institutions, and the corporate sector will have to work in partnership to reach the goals that we set ourselves for the future.

We need the participation of the people particularly, in all aspects of sustainable development whether it is in community-run water harvesting, in replacing older transport vehicles with newer pollution-free vehicles run on clean fuels, or in removing polluting industries from residential areas. Governments and NGOs have to work in close cooperation with each other. For instance, the Gujarat government's Sardar Patel participatory water conservation programme, launched in January 2000, has successfully led to the creation of nearly 10 500 check dams built with people's participation. The media, too, has an important role to play in highlighting the imperative need of such constructive partnership.

The delegates at this summit will deliberate on many important issues relating to sustainable development. The participants from India can learn much from the international experience. The distinguished foreign delegates will also get a better appreciation of India's experience in poverty eradication and sustainable development. With these words, I have great pleasure in inaugurating this summit.

Vote of thanks

R K Pachauri
Director-General, TERI, New Delhi, India

Poverty: the global challenge for governments, industry, scientists, and civil society 19–20

We are deeply privileged to have in our midst today our Prime Minister and to hear his views on a subject that concerns all of us present here and all of humanity globally. Sir, we in India are indeed fortunate to have a person with your vision, foresight, and knowledge, guiding the ship of the state to a destination of peace, prosperity, and welfare, not only for the benefit of the present but also for future generations. Our profound gratitude to you for the honour that you have bestowed on us. May we look forward eagerly to your presence at subsequent DSDS (Delhi Sustainable Development Summits) to be held annually. We assure you that this event will emerge as an important gathering where the best and the brightest from all over the world will congregate annually.

Mr Maurice Strong symbolizes the world's conscience on responsibility to the environment and the philosophy of sustainable development. Mr Strong is a legend of these times and a source of inspiration to those committed to the conservation of the earth's ecosystems. Sir, since you have guided the two most important world summits on environment in 1972 and 1992, we hope that your leadership will reach greater heights in the summit in 2012.

We are indeed indebted to Mr Mark Malloch Brown for being with us and I personally express my appreciation for his coming to Delhi for the summit from Indonesia, and going back to complete his commitments a day later. As the Administrator of the UNDP (United Nations Development Programme), he carries a heavy responsibility in facilitating and inspiring economic development in the poorest sections of the globe. We wish you all the best and thank you for UNDP's partnership in this summit.

May I also thank our Chairman, Dr A Ramachandran, a brilliant technologist, civil servant, and intellectual with outstanding qualities, who all of us at TERI respect and admire.

This summit would not have been possible but for the support that we have received from the Tata Group as the prime sponsors of this event. I would also like to thank the International Development Research Centre, Canada, for its contribution. I acknowledge the help and guidance that we have received from our partner organizations—the UNDP; the World Business Council for Sustainable Development; the Ministry of External Affairs, Government of India; and the Government of Delhi. I also acknowledge the support that we have been receiving in preceding activities, particularly *DISHA (Directions, Innovations, and Strategies for Harnessing Action)* and *GREEN India 2047* (Growth with Resource Enhancement of Environment and Nature).

From our corporate sponsors, I am delighted to acknowledge Mr Pawan Munjal of Hero Honda as one of the major supporters. I also express my gratitude to all the members of the diplomatic corps, senior officials of the Government of India, leaders of the corporate sector, and all the distinguished ladies and gentlemen who are present. A special vote of thanks for the representatives of the media who have displayed deep interest in the issues being covered in this summit. We regard them as important partners in mobilizing civil society towards a sustainable future.

May I also in conclusion thank the officials of the Prime Minister's Office, the Delhi Government, and several officers in the Ministry of External Affairs. Mr S T Devare, the Secretary of the Ministry, is present here and I would like to acknowledge that the Ministry helped disseminate information about this conference widely. I would like to thank the staff of Vigyan Bhavan. Last but not the least, I thank my colleagues who have worked diligently as a team in organizing this conference and the several satellite events that are taking place concurrently.

We are delighted that several organizations have come to join hands with us and organize events related to this main theme at the time of this summit. This is an expression of the wide interest this conference has evoked. We believe that the DSDS will become a destination in the years ahead for leaders of public opinion, scientists, politicians, businessmen from around the world, and all those who have an abiding commitment to the welfare of the human race. As an immediate output of this summit, we would prepare a global plan of action, which will be disseminated on a large scale. We take the advice that Mr Maurice Strong has given us as treating this as an important opportunity to influence the process of Rio + 10 or Stockholm + 30. I hope we can join hands together to create a future that is sustainable, ethically fair, and equitable.

Plenary sessions

Plenary session 1	Poverty and sustainable development
Plenary session 2	Science, technology, and enterprise development for the poor
Plenary session 3	Corporate social responsibility and poverty alleviation
Plenary session 4	Effective governance and communications for promoting sustainable development
Plenary session 5	Financing sustainable development
Plenary session 6	Sustainable agriculture, food security, and knowledge for rural development
Plenary session 7	Energy for the masses

Plenary session 1

Poverty and sustainable development

Chairperson: Emil Salim
Panellists: L C Jain, Maritta R von Bieberstein Koch-Weser, R K Pachauri,
K Venkatasubramanian

Poverty: the global challenge for governments, industry, scientists, and civil society 23–36

Chairperson's remarks by

Emil Salim, Chairman, National Economic Board, Government of Indonesia, Jakarta, Indonesia

Poverty is more than income based, as it also covers the lack of education and health, the lack of basic necessities, limited access to markets, credit, and capital as well as inadequate institutions to enable the poor to escape the trap of poverty. Poverty is a global challenge for governments, industries, scientists, and civil society. Sustainable development is better known than its implementation. Although incomes have increased the world over, the patterns of development have degraded the environment. What is most disturbing, however, is the fact that development has not thus far been equitable. The *World Development Report of 2000/01* shows that the average income of the 20 richest countries is 37 times the average in the poorest countries, with the gap having doubled in the last 40 years.

In Rio, the need to implement sustainable development was recognized, but environments continue to deteriorate, implying the need to revisit the concept of sustainable development. The major building blocks of sustainable development are as follows.

1 Eco capital, not only natural resources, but natural resources within the context of ecosystems
2 Human capital, also the human brain, in totality—the outcome of education, health, and culture
3 Man-made capital as revealed in the products of knowledge, science, and technology that make possible increased value-added and material ecosystems and natural resources
4 Social capital, which refers to societal capacity to work together on the basis of norms, procedures, tradition, memories, culture, and similar features, making possible the subordination of individual interest to that of larger social groups.

This societal capacity needs to be nurtured and continuously developed, especially for societies with diverse religions, ethnicities, races, political ideologies, dialects, and other possibly divisive factors. Diversity can cause social conflict but can also strengthen stability, as demonstrated by nature's biodiversity.

Sustainable development is a product of the interaction of these four modes of capital and it is in this context that the issue of poverty has to be seen. Different modalities related to the issue of poverty and sustainable development can be discussed and developed. The intention, however, is to locate this question within the context of the world to explore how poverty as a global challenge can be met by government, industry, scientists, and civil society. Global linkages are revealed in trading, international capital, and investment flows; the quantity and quality of development assistance, technology transfer, the spread of science, education, and information; disease prevention through global health development; and the management and development of social conflict resolution in an environment of diverse races, ethnicities, religions, armed conflicts, and political ideologies. Efforts at linking nations require appropriate institutional arrangements, raising the question of the extent to which the institutional arrangements of the United Nations, the International Monetary Fund, the World Bank, the World Trade Organization, etc. are sufficient to meet these challenges. It is, of course, not the intention to formulate a full and comprehensive strategy for poverty reduction through sustainable development in the span of two days' discussions. Although a comprehensive strategy of poverty reduction cannot be developed here, it is possible to sketch a map of efforts towards sustainable development made by governments, industry, scientists, and civil society.

L C Jain

Chairman, Industrial Development Services, Bangalore, India

Recently, the President of South Africa asked researchers to prepare a status report on poverty in South Africa. The researchers spent a lot of time first in defining poverty. They also interviewed a poor woman in the village and asked her, 'Mama, what is your definition of poverty?' She said that poverty meant not knowing from where your next meal was coming. That is indeed what poverty is, to millions and millions of people across continents. Economists, administrators, and planners have varying and diverse definitions. However, if to the poor, food security is the measure of poverty, then, understandably, that should be addressed somewhere. In India, enhancing food security has always been an important consideration.

The latest mid-term appraisal by the Planning Commission says that while the consumption of poor per capita has gone down, they also have godowns or warehouses embarrassingly full of foodgrains. The poor remain hungry despite this, because they have no purchasing power. The poor had found a way of growing their own food in what is called subsistence farming but the launch of a commercialized farming programme to produce surplus food, resulted in a surplus in 10% of the geographical districts. The remaining 90% showed a deficit. The food from surplus areas goes first to warehouses, and is then transported and distributed through public distribution systems to the deficit areas at enormous costs and losses. But by the time it reaches the villages where the poor live, they are unable to draw upon it. Dr Bimal Jalan, the Governor of the Reserve Bank of India, recently showed that in two of India's densely populated states, Uttar Pradesh and Bihar, with a majority of the poor, only five per cent of the poor are served by what is called the public distribution system, while 95% have to depend on the market, for which they don't have the purchasing power.

Sometimes, though, people have demonstrated through initiatives and organizations the possibilities of a different approach. Rajasthan, which is a desert state is cited as an example. In Alwar district, through the initiative of some NGOs, a transformation has been brought about by arresting water by rain harvesting. In 550 villages they have been able to harvest water; as a result, more food and more milk is produced in that area and the poorest have better access to food and milk because it is produced locally. A number of initiatives in the country's pockets of poverty and drought have brought about transformations. This, then, is achievable. If the centralized, top-down initiatives have not made a dent in poverty after five decades, there is perhaps another way of doing it. Instead of the top-down initiatives, the building should start from the people at the bottom. The poor themselves must be at the centre of planning and decision-making to produce growth. Availability becomes important. The highest stake in that kind of production is held by the very same people whose hunger has to be met. They are the first to respond. The Indian Parliament, in an attempt to address this problem, made the seventy-third and seventy-fourth amendments to the Constitution which envisage that every single village will have an elected representative body called self-government. The Constitution says that a plan will be developed for the economic development of the village, combining economics with equity. The people have soil, water, vegetation, livestock, and they have knowledge of the local conditions and hands. They also have demand, hungry stomachs to be fed. If these are all put to active duty, they will be the first to produce food. Added up from village to village, the impact on our GDP will be profound and the hunger of the poor will not have been fought in abstraction.

Maritta R von Bieberstein Koch-Weser*
President, Earth3000, Bieberstein, Germany

Sustainable development is the declared objective of development aid, but often fails to materialize. The gap between the sustainable development objectives and results-on-the ground has roots in systemic shortcomings. Here, this is briefly exemplified by four 'gaps': analysing 'sustainable development needs' in the context of prevailing patterns, concepts, and instruments of aid.

Gap 1 Nature often needs to be managed in a transboundary fashion, while our development assistance tends to be nationally focused. Instead of primarily orienting assistance on the basis of historical borders, a development assistance system should equally take care of natural boundaries.

An example is sustainable management of critical natural resources such as fresh water and ocean resources. There is an urgent need for integral management of the entire river basins throughout the world's increasingly degrading watersheds. River basin management is a primary need now and even more so in future, as populations will continue to increase. So far, river basin management has been wanting—from the Amazon to the Ganges, the Brahmaputra, or the Nile.

A related issue is that of large aquifers, which, like rivers, do not always obey national, state or provincial borders. Again, this calls for the long-term transboundary management of underground water resources.

An even bigger conundrum are the oceans, which can arguably be seen as the largest source of renewable protein for the future. However, coral reefs and fish stocks are going down just about everywhere around the globe. Oceans cover roughly 70% of our planet, but development systems do not focus on their sustainable management.

What is needed for the sustainable management of critical resources would be a system that can deliver over the long term (not just during short-lived one-off projects), and across political units. To attain at least some measure of sustainable development, we must have policies that allow people to collaborate in interconnected eco-spaces. An example is the need to design environmental service and economic concepts, which will reward people upstream for maintaining watersheds to the benefit of populations and hydro-energy or irrigation projects downstream in the valley below.

Gap 2: long-term maintenance During recent decades, the pattern of aid has mostly delivered short-term project finance. Development in the larger sense has created environmental achievements, which now need to be maintained. Take for example protected areas: Almost 10% of the earth's surface is under some form of conservation or special protection. Is this being enforced? Unfortunately, in many cases it is not. A related urgent case is UNESCO's (United Nations Educational, Scientific and Cultural Organization) severely underfunded World Heritage System. World heritage applies both to heritage in the natural world as well as the cultural world, covering some of the world's most treasured and unique sites—which must not be lost, but need to be protected in perpetuity.

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* Former Director-General, The World Conservation Union, Switzerland

Conservation requires development assistance systems that go beyond one project after another. We must design ways to provide for long-term, reliable, albeit relatively small financial flows. The protection of nature should be conceptualized akin to health care. Protected places undergo periodic stress ('can get sick'); there can be interruptions in local funding, and insurance and emergency systems are needed from time to time.

We have seen that nature conservation achievements – often made over prolonged periods of excellent protection – can be undone in the shortest time spans. This happens when the governments lack stability, and when local salaries for park wardens go unpaid, or when wars or refugee streams intervene. Under duress, and in the absence of help, local people quickly turn from protectors into hunters of rhinos or tigers, or they become loggers of precious timber.

In support of long-term conservation, there is a need for broadly gauged support systems, and for less exclusive reliance on the public sector.

Gap 3: investment in 'foresight' Project portfolios of aid agencies reflect scant foresight. Most importantly, this is evident with regard to natural disasters. Natural disasters are 'generically' foreseeable, and an integral part of local environments. Just take the examples of El Niño or recurrent weather events in the Bay of Bengal. Earthquakes, landslides, and cyclones are regular occurrences, and their economic and human costs can be greatly mitigated through investments into preparedness, commensurate building standards, and the protection of mountain-sides and wetlands. The annual costs of natural disasters in developing countries are a tremendous drain on local development and poverty alleviation.

Instead of *ex-ante* mitigation strategies and investments, we see in development aid a preponderance of high cost, *ex-post* relief efforts, which take a disproportionate bite out of national budgets, insurance agencies, and aid budgets.

Gap 4: the 'money first' mode Deliverance of funding does not equal development, but is only a secondary (albeit necessary) ingredient of success.

We have learned that funding can only become effective, where social commitment and appropriate 'value adding' technologies are firmly in place.

There is ample evidence that where local social commitment is weak, it will be difficult for any amount of money to produce lasting social and economic development. For example, conservation areas cannot be protected against the will of local people; nor can agricultural or school projects succeed without them.

There is a need to reverse the aid 'modus operandi'. Too often, government, not local people, is the point of departure in designing development programmes. In India, there are thousands of excellent organizations struggling on the ground, very often under-funded, under-supported, and politically under-connected. Their effectiveness in environmental and sustainable development programmes could be greatly enhanced with more training, connectivity, and funding.

In other words, money continues to be much needed, but should cease to be the starting point. Organizations like the World Bank and regional development banks must go back to their mandate to be, above all, holistic development agencies, instead of primarily disbursement-oriented financial institutions. They must work more directly with the people, and not just with peoples' governments.

R K Pachauri

Director-General, TERI, New Delhi, India

Poverty is not only related to income; it is the relationship of people to commodities and resources and the kinds of choices available to them. Sustainability is, in one sense, a means to sustain ability—the ability of people to retain control over their living conditions implying the concept of choice. There are substantial differences between rural and urban poverty. Urban locations have many people from rural areas. Living in urban slums they may have somewhat higher incomes but lack the social infrastructure, the safety nets, and the human relationships. One may well ask whether they really are better off in any way.

If poverty implies a degree of control over human choice, then natural resources and the services they provide should also be ensured to make those choices available. The good health of natural resources is, therefore, a key ingredient in ensuring the removal of poverty. Typically, natural resources and their conservation and maintenance depend on property rights, the institutions through which these are enforced, and the manner of resource exploitation or extraction. On the other side, environmental processes such as climate change are man-made but removed and distanced from the communities that are affected. The problem is caused by societies which, perhaps, may not suffer at all, and the suffering is borne by another set of societies.

Poverty is also influenced by economic factors such as lack of employment and slow economic growth. All of these in turn are influenced by the level of scientific and technological capability of a society, the national economic policies that drive economic activity, and global economic factors, now increasingly important. Some of these relationships could be embedded in what one might define as a set of technological choices

With the technological developments that have taken place over the past few decades, there is considerable hope of being able to direct the benefits towards the common welfare of very poor societies. In other words, technology, which could be the result of fairly sophisticated scientific endeavour, can be made user-friendly for low levels of knowledge. For instance, biotechnology has major implications for agriculture, including marginalized agriculture; information technology can provide access to markets; RETs (renewable energy technologies) could have implications for energy security of rural areas; and natural resource management has implications for sustainable development. Microcredit and decentralization attain importance in terms of empowerment of local communities.

Why is there a need to focus on rural areas? There is a clear nexus between rural and urban poverty. To a large degree, the slums in cities are the result of migration from rural to urban areas, calling for a look at the root of the problem rather than an end-of-pipe solution. The neglect of rural poverty also means that solutions are not being disseminated widely. However, while technology and hardware may have the potential to solve some of the problems of poverty, institutional infrastructure and the policy framework for overseeing it are imperative.

Local capability and knowledge must be built so that rural areas become not only importers of technology but also innovators in their own right. In any kind of production system, one combines capital, labour, raw material, and energy to produce goods and services, and the manner in which they are combined is called technology. There is a vast difference between modern production systems, where technological sophistication is easily transferred to the production site or the production system, and rural areas, for the above reasons. Therefore, while there has been emphasis on providing capital, labour, or other inputs, technological aspects have not been focused on with regard to poverty alleviation programmes. Typically, employment is provided in a Keynesian manner—digging up ditches and filling them up again. More and more capital in the form of equipment is thrown in, which may or may not fit the requirements of a rural society. Knowledge can be built up whereby the resources that are being utilized even today can produce outputs more efficiently, and at lower cost expense of resources.

An innovation is needed in agriculture. Whether it takes the form of biotechnology, which is controversial today, or more traditional methods is a separate issue. This innovation will emerge from the application of science and technology and affect production costs at the farm level. It may also have major implications for the ecology of farm areas because a blind increase in the use of chemical fertilizers and pesticides will not benefit the environment and the ecology of rural areas.

The extension of grids and centralized supplies of electricity have their limitations—financial or in terms of the feasibility of providing electricity to all the poor locations in the world. The ability of households to set up the infrastructure and the wiring for getting electricity from the grid is also limited. However, there is reason to be optimistic about the improvement of RETs and their effectiveness, as well as about a reduction in costs. Combining these two realities gives an opportunity to start on a different basis whereby RETs can be used on a much larger scale in poor, rural locations. There would be major environmental and social benefits because in several societies a number of women and children spend hours just to collect fuelwood so that they can cook two meals a day. The environmental advantage would be a reduction of indoor air pollution. TERI's GREEN India 2047 (Growth with Resource Enhancement of Environment and Nature) project found that an estimated 2.5 million people died prematurely in this country each year as a result of air pollution, the bulk of which resulted from indoor air pollution related to cooking with poor quality biomass fuels.

Information technology makes it possible to disseminate knowledge, and educate people on a large scale, especially about health care. A large number of services in areas which have been insulated from modern development will now become possible by harnessing modern information technology. With information technology also goes the opportunity to provide transparency and information which makes governance more effective and participative.

While realizing the merits of these technologies individually, we must also realize the importance of integrating different technology interventions. Typically, poverty alleviation programmes are based on the initiatives of different departments or ministries or organizations, and these are directed to water or soil or forests, or some other area of activity—say, rural industry or small-scale industrial units; but there is seldom an integrated approach. Studies reveal that the sum total of the benefits from individual initiatives is far less than in an integrated approach. This also means that local institutions that might bring about integrated development should be created with an understanding of the socio-political and economic situations. It will also be necessary to ensure that these technologies are in consonance with the development objectives of the rural community; that they are the agents of these decisions. The intervention could be in terms of facilitation, know-how, and technical capability. However, the decision-making responsibility must squarely rest with the community itself, so that it becomes a stakeholder in the process and is also able to build capacity and a capability for sustaining the effort. Interventions must always be seen in terms of long-term implications, which require that interventions are purely of a facilitating nature, being gradually handed over to local institutions, which ultimately take over.

TERI is planning a major initiative in focusing on the integration of technologies for poverty alleviation where it will look at the policy dimensions, information requirements, knowledge requirements and also carry out a number of activities at the grassroots level, not merely in India, but also with partners in other countries.

K Venkatasubramanian

Member, Planning Commission, Government of India

The World Development Report 2000-2001 Attacking Poverty: an analysis

The latest *World Development Report 2000–2001* zeroes on 'attacking poverty'. The World Bank, which has been pioneering these reports, uses these as instruments to shape global policies as a leader. In the latest report, they feel (contrary to their original stand for a long time) that mere market reforms cannot alleviate poverty. Something more is needed. They feel poor countries have to add greater inputs. They have also given up their age-old bizarre conviction that mere growth alone can deliver the goods. For the first time, perhaps, they have brought in the ideas of political empowerment and social security along with better opportunities to the poor as ladders for going up.

When I studied economics under the noted French Professor Rev. Fr. P. Carty S J, he used to often quote Prof. Benham's *Poverty in the midst of plenty* scenario. In India, we have everything but we appear to have nothing too. Real governance makes the difference.

Significantly, Mr James D Wolfensohn, President of the World Bank, begins his 'Foreword' to the *World Development Report 2000–2001* with these words: 'Poverty amid plenty is the world's greatest challenge.'

Of the world's 6 billion people, 2.8 billion live on less than 2 dollars a day and 1.2 billion live on less than a dollar a day with 44% of the deprived ones living in South Asia alone.

In its major report on poverty in 1990, they swore 'by market reforms for fast growth as the panacea' but today (2000/01) more empowerment of the poor along with social security plus provision of opportunity seem to be the 'runway' for take off.

For example, even though India had a strong economic growth of 6.1% brought in by market forces, poverty reduction really slowed down. Public expenditure on health and education has been steadily rising but social spending has still not been really effective.

To sum up the report, higher growth rates do not guarantee a lower incidence of poverty. Fresh confirmation of the maxim comes from the World Bank's *Annual Report 2000–2001*, which says there were far too many indigent Indians – 36% of the 1 billion population – than the nation can afford.

The rise in the numbers of poor — yet another evidence to repudiate the once-venerated trickle-down theory of economic growth – occurred even as the GDP (gross domestic product) growth rate remained at a high of 6.1% between 1990 and 1998.

At the same time, the chasm between the better off and the worse off — something economists would call the index of inequality — has widened. The reason, says the World Bank, is the difference in the consumption levels of the urban and rural populations.

With more than 360 million people struggling below the official poverty line, India accounts for an estimated 40% of the world's poor. That it had an annual per capita GNP (gross national product) of 440 dollars in 1999 is eclipsed by the fact that the country had the highest concentration of poverty.

The only way to reverse the trend, says the report, is to accelerate rural development and poverty reduction through cuts in spending on poorly targeted input subsidies, investing in rural infrastructure, providing more effective rural services, especially to the poor and the socially marginalized. Other measures could include improving the management of water, forest, and other natural resources and liberalizing the rural economy, including the rural financial system.

'While India spends twice as much on agriculture as its East Asian neighbours, the composition of its public spending is not conducive to faster, labour-intensive rural growth and poverty reduction,' the report states.

The report has highlighted the slow progress made by India in infrastructure and has suggested that it set up a special trust to improve power, roads, and telecommunications.

'The introduction of private capital in key infrastructure sub-sectors has been slower than anticipated, as have been the results. Few investments have been brought to closure under the new national policies. The country continues to be dogged by large central and state deficits. This is attributed to heavy subsidies, narrow tax base, and the cost of the large civil services.'

'A major obstacle to further development lies in India's large central and state fiscal deficits, which are a risk to macro-economic stability, divert funding from the private sector and hinder financial sector reforms,' the report states. It added, at the state level, the lack of deficit reduction has put India's poorer states in an increasingly unsustainable position. The deterioration in the state expenditure in critical areas such as health, education, roads, and irrigation is alarming.

While the development report stressed the need for hastening the process of privatization to increase efficiency, it also highlighted the need for improved sectoral regulatory authorities to stimulate efficient private sector participation. 'Public sector production remains large in areas where private production would be more efficient, reflecting limited progress on privatization,' the report states.

The World Bank's South Asia Director, Roberto Zagha, does not agree that the old ideas have been given the go-by, but says there has been a shift in emphasis only. The new mantra seems to be *empowerment of the poor* and increased access to resources. It is this plank on which Prof. Amartya Sen got the Nobel Prize for his thesis that the Bengal Famine was not the result of the absence of food products but a direct result of the absence of purchasing power. Prof. Sen pointed out rightly that food was available but there was no money available to buy. This idea seems to be the undercurrent governing the latest World Bank Report (2000–2001). This report, which says that it is based on the 'voices of the poor', has catalogued the views of more than sixty thousand men and women, living below the poverty line in more than sixty countries, whom they actually contacted. This is a remarkable exercise and one should place on record the deep sense of appreciation of the *World Development Report 2000–2001*.

From India, they cite the case study of a lady who goes by the name Basrabai, of Mohani village located near Ahmedabad, for escaping poverty through affirmative action or political empowerment. Basrabai is the first lady to be the Sarpanch in her Panchayat in this area and her story gets a lead in the *World Development Report* also.

The mantra seems to be

1. **Opportunity** by stimulation of economic growth;
2. **Empowerment** by strengthening the ability of the poor people to take and shape decisions; and
3. **Security** by protecting the poor from illiteracy, diseases, shocks, disasters, and violence.

This is worth repetition: OES (Opportunity, Empowerment, and Security) is the strategy to shield the poor majority from the onslaught of poverty.

One point to be highlighted again is that poverty alleviation slowed down in the 1990s against a backdrop of a strong economic growth of 6.1% as per National Accounts Statistics. Hence the new conviction that economic growth alone is not enough to alleviate poverty.

The World Bank Report brings in, and the NSSO (National Sample Survey Organization) also supports and underlines, the important fact that the slow rate of poverty reduction was because of slow growth in average consumption as per NSSO statistics.

According to the *World Development Report 2000–2001*, India had suffered severe deprivations in the education and health sectors — especially in the northern region where caste, class, and gender inequalities are particularly strong.

In case studies of Bihar and Uttar Pradesh cited in the Report, poor people have emphasized their extreme vulnerability and the absolute ineffectiveness of state institutions, like schools, hospitals and especially the police, which failed to check regular murders of scheduled caste and scheduled tribe people by private armies in Bihar. Law and order miserably failed here. It is to be noted here that the latest thinking in economics includes law and order maintenance as a major input in development.

In the past, poverty reduction in India lagged behind that of East Asia because of slower growth and significantly lesser progress in promoting mass education and basic health. The Report notes that 'more recently, however, growth has accelerated and the poverty level is falling.'

The Report highlighted the marked differences within the country in the south, particularly in Kerala, which has better education and health facilities.

The Report highlights that Kerala has life expectancies greater than even in Washington, DC despite vastly lower income levels. The Report says that the effectiveness of action in Kerala has been attributed to its strong tradition of political and social mobilization.

Suggesting priorities for action in India, the Report says that accelerated poverty reduction would require faster growth, which in turn demanded liberalization especially in agriculture, and better provision of infrastructure, lacking in most parts of the country.

Incidentally, as per PPP (purchasing power parity) calculations, India has moved up from fifth to fourth place in the world. India is now only behind the US, China (which has moved up to the second place), and Japan in PPP calculations.

Improving living standards seems to be a major hurdle still. A comparative study of Bangladesh, China, India, Indonesia, Malaysia, Pakistan, and Sri Lanka on growth parameters is very revealing (Table 1).

Table 1 Growth patterns

Country	*Private consumption growth per capita: % average annual growth (1980-98)*	*Child malnutrition: % under age 5 (1992-98)*	*Life expectancy at birth: males/ females (1998)*	*Adult illiteracy rate: % of people (15 and above) males/ females (1998)*	*Urban population: % of total (1980-99)*	*Sanitation access in urban areas: % of urban population (1990-96)*
Bangladesh	2.1	56	58/59	49/71	14–24	77
China	7.2	16	68/72	9/25	20–32	58
India	2.7	–	62/64	33/57	23–28	46
Indonesia	4.6	34	64/67	9/20	22–40	73
Malaysia	2.9	20	70/75	9/18	42–57	100
Pakistan	2.0	38	61/63	42/7	28–36	53
Sri Lanka	2.9	38	71/76	6/12	22–23	97

If we try to organize a total attack on poverty, perhaps the Indian economy may emerge still stronger. The key to this seems to be education and empowerment. Perhaps, education leads to empowerment, which leads to better living.

This is a real challenge. We have to face this and wage a severe battle with poverty to save the humanity. The battle lines have been drawn by the *World Development Report* and we have to act fast. Today's need is strong political will for quick action.

Summary of the questions-and-answers session

The panellists addressed issues such as the empowerment of women through self-development programmes, the ignorance of citizens of the developed world about international issues, means by which schemes targeting the poor can actually be made to reach and benefit them, and the lack of action on the much-discussed theoretical framework. It was pointed out that joint forest management as a source of augmenting incomes was not given sufficient importance through legislations or government policies. Areas such as Vananchal, Jharkhand, and Uttaranchal were the richest in resources but had the poorest populace, showing that systemic inadequacies existed and had to be corrected before the people could be considered partners rather than beneficiaries in sustainable development.

Rural women who earned money through programmes, such as those in the Renewable Energy Network, gained self-confidence, had improved lifestyles, and earned respect in their communities. Technology does not focus on providing basic facilities for women such as improved cook-stoves.

It was also noted that government programmes directed at rural populations had not benefited them economically. This was largely because of lacunae in the conception of the programmes, their implementation, the monitoring machinery, and the political will. To bring about a change in this situation, the involvement of corporates, specially in the rural areas, was suggested. If their image as socially responsible citizens were to benefit them, they would make it part of their business strategy to do things that were socially right. The second major hurdle in the way of eradicating poverty was population. Larger numbers mean more food, more water, greater stress on natural resources, and environmental degradation.

Another basic point related to decentralization, i.e. removing the top–down approach. Institutions should provide a variety of technologies to the people in rural areas who must be allowed to choose their options after considering their own resources and demands. The greatest difficulty was changing the mindset of the policy-makers in the government. It was suggested that the best way to overcome that was to create models of success different from and superior to conventional ones.

Plenary session 2

Science, technology, and enterprise development for the poor

Chairperson: Y K Alagh
Panellists: Yoichi Kaya, Joe Madiath, David Stanton, Joachim Treusch

Poverty: the global challenge for governments, industry, scientists, and civil society 37–48

Chairperson's remarks by

Y K Alagh, Former Power Minister, Ahmedabad, India

Technology may be used to create sustainable opportunities for the poorer sections of the population in developing countries. For example, a project studying 144 agro-climatic regions in India showed that appropriate technology was available to create food safety, meet energy requirements, and generate employment at sustainable levels. Another example is TERI's tissue culture facility at Gual Pahari, developed jointly with the Department of Biotechnology, Government of India. Here, TERI can within six months provide a tree for any agro-climatic region in India, which can generate employment, food security, and energy. There are so many examples of smaller artisan communities, where poor people link up with national or regional or global markets and make money because basically the newer technologies, as Michael Piore at the Massachusetts Institute of Technology tells us, are scale-neutral. There are similar examples in information technology. Technology can now be used for the poorer sections of the community to gain access to health facilities, basic education, food security, and communication.

During the last two years, India lost 100 000 hectares of forest land. Two NGOs (non-governmental organizations), have brought 118 000 hectares under tree crops. The concern is whether organizational and financial rules are in place to replicate this on a much larger scale. Rio needs reviewing because it concerns poor people, technology, land, water, employment, and energy. Some work has been done in India with members of the Indian Planning Commission. In the second half of the 1980s, 15 projects where

The Alagh Committee on Corporatization Provisions for Cooperatives led to a Bill on Amendment to the Companies Act.

villagers had solved problems of drinking water, food, and employment using technology were studied. Today, instead of working in isolation, many cooperatives, farmer associations, and NGOs are working in synergy; for example, cooperatives are linking with NGOs to form producer companies or an NGO is working with the government. Many fascinating new experiments are taking place but legal and financial systems cannot cope up with them. The challenge for technology is to find ways to such newer forms of organizations that have a wider reach. A policy environment that is hostile to cooperatives, NGOs, or people's participation is not going to work.

Yoichi Kaya

Director-General, Research Institute of Innovative Technology for the Earth, Japan

The research institute called RITE (Research Institute of Innovative Technology for the Earth) conducts research in the areas of energy and the environment. People say that the transfer of technology from developed countries to developing ones is important because developing countries lag far behind in science and technology but that is probably not true. Energy efficiency in capital terms, that is energy per GDP (gross domestic product), is higher in developing countries than in the developed countries, but the income level is lower. If one looks at energy per GDP for purchasing power parity, the value of developing countries is lower than that of developed countries.

In terms of daily commodities, the energy efficiency in developing countries is not lower than that of developed ones. Therefore, in this sense, the endeavour of science and technology in some areas in developing countries is rather close to those of the developed ones. The important point when collaboration between developed and developing countries is considered is taking the knowledge of both sides into account. Collaboration can take place in areas of technology different in character depending on the social, economic, cultural, geological, and climatic conditions of each region.

One kind of development is to modify existing technologies, so that they can adapt themselves to different economic and the social conditions. An example of successful cooperation between two countries is the development of desulphurization devices in developed countries such as Japan, United States, and the European Union. In China, a developing country, desulphurization is an important technology because coal is the main source of power generation. But the desulphurization devices in use in developed countries are quite costly because of which many power generation systems in China are operated without desulphurization. Some groups in Japan decided to cooperate with the Shinyang University of China to reduce the total cost of desulphurization devices by making modifications in them. In this case, an equal contribution from both the Chinese and the Japanese side is essential. The second type of development is that of innovative technologies, whose characteristics are different for different local condition. Japan is collaborating with the Peking University to clean up the Dianchi lake in China by bioremediation technologies. The key is to find what kind of microorganism is appropriate for reducing toxic chemicals, in this case, nitrogen. The microorganism to be utilized for this purpose will be different for different regions. The Japanese groups have a lot of experience in their own country, but not so much in China; on the other hand, the Peking University has a lot of experience of microorganisms in China. The collaboration of the two groups is important to complement each other's knowledge. A joint study on mega-cities in the future should be carried out to tackle issues stemming from over-population, such as accumulation of solid waste, deterioration of air and water quality, reduced greenery, and traffic jams. Local, economic, social, cultural, geological, and climatic conditions vary among these mega-cities. Therefore, the exchange of knowledge among scientists from different countries is necessary to find appropriate solutions.

Joe Madiath

Executive Director, Gram Vikas, Orissa, India

Science and technology for the poor in no way imply poor technology or even poor science; the technology has to be the best and the most apt. Liberal use of the term 'appropriate technology' in development parlance has reduced it in many cases to mean outdated and outmoded technology, which is often not useful. What is needed is technology most suited to the situation the poor are in, and not that which costs less. Technology at low cost is an additional advantage, but should not be the precondition.

In mainstream understanding, advancements in science and technology directly correlate to wealth creation for the rich. This has been particularly exemplified by the growth in the field of information technology. But in the world of the rural poor of Orissa, science and technology directly relate to the question of survival on a human plane. A few simple interventions will go a long way in lifting these people from the morass of subhuman existence to a life of dignity and quality.

Delivering modern technology

Today the poor in rural areas have to make a quantum leap to be considered on a par with citizens of urban areas. To do this, they must have access to more energy. Most energy devices currently in vogue are geared towards electricity. In rural areas characterized by poverty, access to grid electricity seems very remote. So locally produced electricity has been used for homelighting, to provide motive power for lift irrigation, for operating cold storage units for food preservation, for undertaking processing and value-added activities. Here, interventions such as the development of micro-hydel, biomass-based gasifiers and solar photovoltaic power can open up possibilities for economic development. With the current level of technology and enormous investments in R&D, these are still not cheap.

'Communication' is another medium for global convergence today. The Grameen Bank in Bangladesh has already demonstrated how their villages can be connected by cellular phones. Probably the technology most appropriate to network rural communities in far-flung areas, even for their basic needs, is the satellite telephone. If the investment in establishing a huge network of cables and wires and small exchanges is saved and blocked in a corpus, and the income from that goes to meeting part of the cost of the phone as well as cost per call, it should be possible to afford taking satellite telephones even to the most remote Indian villages. Wireless has been tried but has not succeeded; we have to continue and find the most appropriate solution.

With phones and electricity comes access to the Internet, and a whole new world of information that can change the dynamics of these communities. From timely access to medicines to an awareness of commodity prices and schemes of the local government, information will be accessible at their doorstep. And like the 'venerated civilized society', they too can fix an appointment to meet the Block Development Officer before they trudge miles to meet him.

The danger is that often such technology comes without the essential package of after-sales services. Also, given the context, any science and technology intervention has to be accompanied by efforts in building capacities locally (both human and financial) so that the know-how of maintenance and repair rests with them. This itself can breed viable service enterprise in rural areas.

Simple solutions

Advancements in science and technology that stem from the laboratory have to find a place in practical and most basic applications to really impact the people I work with. This strikes me as I travel, when I meet people living on lands which are barren and bereft of tree cover. The science of watershed, which stems from traditional wisdom, but which is being enhanced by new technological advancements especially in development of irrigation infrastructure, can effectively transform harsh landscapes to productive areas.

Most villages located on hills today face an acute shortage of drinking water. Water sources are seemingly moving further away from villages. A viable solution here is diverting the flow of natural springs using the principles of gravity and siphoning right into every house in these villages.

Often we do not need heavy R&D, just some creativity, encouragement, and the courage to take risks. Much as fitting a ball bearing to a water-lifting device to draw water from a well, or a better designed bullock cart can make incremental changes to poor people's life and work.

Redefining enterprise promotion

The overpowering mainstream has systematically subdued traditional knowledge systems, skills, and enterprise through a process of denial. The current system of awarding contracts on the basis of estimates and quotations does not recognize traditional skills and knowledge. The PWD (Public Works Department) will not allow them to construct a diversion weir, even with proof that they have the knowledge. Recently, during our work in severely drought-prone areas of Gajapati, we thought of bringing water from across the hill to irrigate at least 500 acres of land. While engineers of the Land and the Water Department said it was not possible, a group of Saura adivasis came forward and said that they could do it. They asked us for 400 000 rupees and a time period of four months. The local villagers vouched that they were traditional engineers and could do the job. We took the risk and today the area has water. They need an additional 2 million rupees now to develop the structures further, but the government will not give it to them.

For their survival, these Saura engineers said that they were forced to work as unskilled labourers on jobs undertaken by contractors. These people need greater encouragement, patronage, and capacity building to compete in today's world of contracts.

I have also found among adivasis some of the best construction technicians; they have an innate sense of aesthetics and symmetry and a grasp of building technology. In such a context, equipping them with skills such as masonry, carpentry, and the like can provide them viable alternatives that fit into the existing job context.

There also have to be systematic interventions to develop the enterprise approach in the value that people attach to land, water, animal, and other natural resources. These efforts are often curtailed by lopsided policies which infringe on people's traditional rights to the resources.

Frequent and huge forest fires often destroy large tracts of dense forest. I have found villagers staying close to these forests often looking on without concern. Why have we reduced communities so closely linked to the forests to such a situation, where even their feelings and emotions are curbed? The answer is simple—the people of the forests have been alienated so much that they have no control and no stake at all in the trees that they grew up amongst, even those in their backyard.

We suggested that the government allow tribal communities access to the forests just to grow pepper vines and creepers of yam at the bottom of sal trees, so that they see some benefit from protecting the trees. Predictably, the idea did not find favour with the government. In a recent encounter with an adivasi in the Thuamul Rampur block of Kalahandi district, I found him felling a large sal tree. When asked why, he said it was to capture a beehive at the top of the tree. He was not being naïve. He had no right to either its seeds or its timber, and he would have to watch contractors log it and take it away, so he felt no remorse cutting it. It is such lopsided policies that are destroying the forests. People have to see an intrinsic benefit being derived from the resources and for this favourable policy and enterprise development efforts must be synergistic.

Grants versus loans

I believe that the poor can and will pay for products and services that they believe will improve their quality of life. At the same time, we cannot be blind to the double standards being applied by the government and multilateral agencies when it comes to treating the infrastructure needs of urban and rural areas.

A salary-earning city dweller can earn a tax rebate if he/she borrows to construct a house. Do city dwellers pay for the construction of roads and bridges, building schools, laying of telephone lines and setting up exchanges, power generation systems? Governments subsidize, directly or indirectly, all these services and facilities. The question is whether or not there is a social cost in ensuring that all the rural poor have access to these. We believe that the government needs to pay for its social obligations, in ensuring adequate efforts in making science, technology, and initiatives in rural enterprise available to the poor in rural areas. And if the government does not have the resources to pay, bilateral donors and financial institutions can contribute towards these. At the same time, we are certain that communities need to pay for and participate in such initiatives so that necessary ownership and stakes are created within the communities.

David Stanton

Chief Enterprise Development Adviser, Department for International Development, London, UK

In our newly globalized world, free movement across borders of knowledge, information, goods, capital, technology, and labour is rapidly changing the business world. It presents unprecedented opportunities for economic growth.

Globalization is considered by many as an opportunity mainly for big businesses in the rich industrialized countries; in fact, it is also a major opportunity for poorer countries and smaller enterprises. However, formidable constraints in developing countries separate those businesses that can gain from globalization from those that cannot. These constraints include limited market information, inadequate training, poor market infrastructure, and outdated technology.

But now, as never before, there are opportunities to overcome these barriers: better trading, transport, and telecommunication networks exist; and cheaper and easier access to information, technology and training is available. These advances can potentially end the economic isolation of many parts of the developing world, building equitable growth and wealth in the place of poverty and conflict.

The work of DfID (Department for International Development) in enterprise development seeks to contribute directly to the international development target of halving the proportion of people in developing countries living in extreme poverty by 2015.

The poor depend heavily for their income and economic security on business, whether through self-employment in micro-enterprises or as employees in small- and medium-scale enterprises. Their most frequent escape from poverty is through successful self-employment in micro and small business, in which the dynamism, creativity, and hard work of poor entrepreneurs is given full expression.

This requires a favourable operating environment in which investment, job creation, and the generation of wealth occurs across the entire national economy, whether for large or small business. Support must be targeted not only directly at the poorest micro-entrepreneurs in the informal sector, but also at small- and medium-scale enterprises that can access national and international markets.

By virtue of their greater scale, financial and technological resources, and their pivotal role linking larger businesses with micro-enterprise, small- and medium-scale enterprises create significant commercial opportunities and employment for low-income groups. However, formidable constraints exist in developing countries to enterprise formation and expansion.

The first is an unfavourable policy, legal, and regulatory environment for enterprise. Despite rapid globalization and deregulation of markets in recent years, there is still a heritage in many developing countries of heavy state intervention, outdated laws, excessive regulation, and downright discrimination against micro-enterprise. Distorted and dysfunctional markets constitute a major obstacle to successful business practice and enterprise development.

The second constraint is the lack of appropriate financial services. Poor families need simple, low-cost savings and insurance instruments to reduce their economic vulnerability. Micro-entrepreneurs also need appropriate credit, insurance and leasing services to support long-term business growth. Despite the recent success of many micro-finance institutions in extending savings and credit sustainably to the poor, these services still reach only a tiny proportion of micro-enterprises. A recent estimate by the CGAP (Consultative Group to Assist the Poorest) suggests that only 15 million out of perhaps 500 million possible clients receive micro-loans. Also, even amongst the strongest micro-finance institutions, few are linked to the commercial banks or mainstream capital markets they need to extend their outreach to more clients.

The third constraint is the shortage of management skill and business development services. The private sector needs access to effective training in management systems, production and distribution technologies, marketing, technology, and market research. Shortcomings in management and skills shortages can cripple business, especially small- and medium-scale enterprises, as they emerge from family control into broader ownership structures. Low productivity, poor resource use, inexperienced management, and low levels of basic or computer literacy and vocational skills in the workforce all obstruct business development.

Finally, small enterprises are constrained by insufficient market knowledge, poor communications, and institutional linkages. Too few enjoy the benefits of adequate physical infrastructure such as roads and transport, or modern communications facilities such as telephones, the internet, trade publications or libraries. Larger enterprises that do possess such facilities are insufficiently integrated vertically with small- and medium-scale enterprises. Consequently, there are market failures as essential business support from financial intermediaries, trade linkages, technology, and knowledge does not flow down successfully to the level of small- and medium-scale enterprise. Large- or medium-scale businesses and small enterprises need to develop institutional linkages and partnerships with each other to bridge this gap.

This will provide new customers and sources of labour and inputs for larger enterprise and new market opportunities for micro-entrepreneurs.

What can we do as development agencies to address these problems?

- To develop a more favourable business environment, we need to raise public awareness of the economic importance of micro-enterprise; engage public and private sectors in dialogue to create better, pro-poor enterprise policy; and simplify and improve business registration, licensing, and other legal requirements.
- To address the lack of financial services, we should strengthen the retail capacity of micro-finance institutions. This should focus on further development of financially sustainable savings, credit, leasing, and insurance services that reach more clients, and advance the institutions providing these services towards full commercial viability. DfID seeks to deepen penetration by mainstream capital markets to micro-finance institutions and small- and medium-scale enterprises. We should encourage the use by donors of non-grant-based support mechanisms, including guarantees and equity instruments.
- To strengthen management and business development services, we should improve the capacity and competitiveness of service providers to respond to enterprise needs. This requires a mix of interventions to strengthen governance and leadership; financial management; production and distribution methods and technologies; and research. To create a better trained workforce, new approaches will also be adopted to deploy entrepreneurs as trainers of other entrepreneurs. International and national agencies should exchange their enterprise development knowledge and experience.
- To improve market knowledge, communication and institutional linkages, we should stimulate trading relationships and other forms of business partnership. These will involve small- and medium-scale enterprises, micro-finance institutions, business development service providers, producer groups, research centres, clients, and suppliers. The focus should be on integrating larger enterprise vertically with smaller enterprise, deepening market activity, trade, and knowledge from big business down to small enterprise. In this connection, initiatives to extend the benefits of e-commerce and new information and communication technology to poor producer groups should be supported.

Other strategic directions

- Increase the emphasis on 'influencing' work with senior levels of government to achieve policy and regulatory reform.

- Seek new models and approaches to pro-poor enterprise development that can be replicated commercially by private investors and institutions.
- Explore non-grant funding mechanisms that minimize subsidy and market distortion, such as convertible loans, guarantees, asset leasing, and equity instruments.
- Engage entrepreneurs and government in active dialogue on private sector strategy by involving them directly in the formulation of private sector policy.
- Have a continued collaboration with other bilateral and multilateral institutions in policy formulation, programme, and project finance. The DfID will also work for better co-ordination between donors, and common agreement on best practice and operating standards.
- Broaden social impact and corporate social responsibility, support better pay and working conditions, comply with core labour standards, fair trading, and ethical investment.
- Evaluate the impact of interventions on job creation, income diversification, and household economic security.

Joachim Treusch

Chairman, Forschungszentrum Jülich, Germany

Money, technology, and materials are helpful in overcoming poverty, but education is essential. This not only implies literacy but knowledge of nature and science as well. The global problems of population growth, energy demand, and material supports and information can be solved through education and research. The Third Meeting of Physical Societies in Berlin, attended by 50 presidents (about 35 from developing countries), led to a resolution that outlined what physicists can do to promote global problem-solving capabilities. The resolution has a three-part preamble. First, physics is fundamental to an understanding of the world. Second, physics has been, is, and will be a major driving force of global, technical, and economic development. Third, the time-scale from the invention to the developed market is rather long, sometimes extending over several decades.

Global economic and cultural welfare has to be guaranteed by a high standard of general education as well as an adequate supply of well-qualified scientists. There is a need to improve the public awareness of science. Primary schools must include some education in physics or at least a knowledge of nature apart from writing and calculating. This is particularly necessary for those who will not be physicists. Political leaders with a sound grounding in science will be far more effective. There is a need to increase the international exchange of scientists, but care must be taken to avoid further damage due to brain drain from poor to rich countries. While political and financial support is certainly needed to reach all these goals, we are convinced that this will reap benefits, though not immediately. There is a need to open our laboratories to schools, classes, teachers, industry, the general public, and the media. In turn, scientists also need to actively train all these individuals. Global problems can be solved only if adequate awareness about these is introduced right at the level of primary schools.

Summary of the questions-and-answers session

Improving economic conditions in rural areas requires proper infrastructure in terms of roads, airports, communications, information technology, financial institutions, etc. Otherwise, we will witness the phenomenon of rural–urban migration as in the case of Delhi.

There is a need to incorporate enterprise development into our education system so that products of such a system are adequately informed when they join corporations. It is in this regard that introducing and discussing global problems at the university level become important.

The control of knowledge is critical in developing countries given the renewed global rules about the control of technology and knowledge. This is evidenced by 97% of the patents that are held by companies of the North even though 80% of the biodiversity is in the South.

It is important for scientists to be in charge of scientific issues such as the biosafety protocols by Cotagenea which took a horrible beating. Transparent discussions are required with respect to the TRIPS (Trade-Related Aspects of Intellectual Property Rights) Agreement and its implications for developing countries. This discussion would have to include civil society, the parliamentarians, and others. Coalitions in civil groups, such as the International Parliamentary Union, that will be tracking such issues are emerging.

A responsible government committed to poverty alleviation is absolutely important so that the efforts of scientists can reach and impact the poor. And it is in this respect that the poor themselves are powerful. They have the power to vote, to elect representatives who will work for their betterment.

However, one must not forget the complexity of the situation. The poor vote a government to power; but the moment a government is in power, say in a country like India, it only consults the rich, the Federation of Industries, etc., and lacks a mechanism to return to the people.

At the micro level, reaching out between agents across the traditional institutional sectors of the states, the NGOs (non-governmental organizations), and the corporate sector results in successful experiments at times. The major role is played by NGOs, where rapport creation is important and a supporting/enabling role is played by the state. There is a need for macro institutions to take account of the micro initiatives successful in different parts of the country.

Globalization is important as it enhances competition and hence efficiency. However, it has been associated with some problems as well, evidenced by the financial crisis in East Asia due to the large-scale movement of funds in and out of the countries.

The East Asian crisis holds many lessons, the main one being the importance of bank regulation. It was the lack of regulation, the excess of lending and the massive exposure of the banks in Thailand, which precipitated the crisis. Therefore, there is a need for a regulatory supervisor that facilitates the role of governments to produce equitable and safe globalized markets. However, this becomes difficult in cases where governments are not transparent. Globalization is associated with risks as governance systems which can protect depositors do not exist. This can be curtailed only by funding R&D initiatives with respect to developing country crops because increases in agricultural productivity would curtail the massive migration of labour to more lucrative markets.

Plenary session 3

Corporate social responsibility and poverty alleviation

Chairperson: Björn Stigson
Panellists: Adrian R A Court, Tejendra Khanna, Ritu Kumar, Sophia Tickell

Poverty: the global challenge for governments, industry, scientists, and civil society 49–60

Chairperson's remarks by

Björn Stigson, President, World Business Council for Sustainable Development, Geneva, Switzerland

When people talk about business there is a tendency to generalize. But, broadly, there are three different major types of businesses.

1. Multinationals, which operate across country borders in a transparent world where they have to report on their activities. They normally adhere to high global standards.
2. State-owned companies, which are generally not under the same pressure, are less efficient and pollute more than the international companies.
3. SMEs (small- and medium-sized enterprises), which operate under very different conditions. They make up the majority of all economic activity in most countries.

The World Business Council for Sustainable Development is a coalition of about 150 international corporations. Our working group on CSR (corporate social responsibility) has the largest number of participants. The first report, entitled 'Managing Changing Expectations', was published about 3 years ago. In January 2000, a second report entitled 'Corporate Social Responsibility: making good business sense' was published. The basic message is very simple: 'Business is not divorced from the rest of society; business and society are interdependent and we must ensure through mutual understanding and responsible behaviour that the role of business and building a better future is recognized and encouraged.' The executive summary says: 'For many companies, managing corporate social responsibility well is no longer seen as an extra cost of burden or hard-pressed management. Broader corporate social responsibility is increasingly viewed not only as making good business sense but also contributing to the long-term prosperity of companies and ultimately, its survival.' Being a good neighbour and showing that you care on the one hand and being successful business on the other are two sides of the same coin. This is the fundamental view that we as an organization and our members hold.

A number of drivers of CSR drove corporations to be more aware and interested in these issues. The tremendous economic growth during the 1990s was not shared equally, neither between nations nor within nations, creating tension and a backlash against globalization, exemplified by the recent demonstrations in Seattle. During the 1990s, a shift took place from official development assistance being the major source of finances to help developing countries, to foreign direct investments in companies, now composing 90% of the financial flows into the developing countries. All over the world, the role of governments is weakening and, at the same time, the role of corporations has increased, so much so that 53 of the 100 biggest economies in the world are corporations. It is not strange therefore that there is a debate about the role of corporations in society. We are concerned that unless we build more stable societies, as Kofi Annan said when he launched a global contact, we will risk a backlash against the open global markets that have fuelled economic growth. Less open markets will not be in the interest of anyone, especially not developing countries. When new people are employed in our companies, younger people often ask about the social standards that we operate within. Investors too look at sustainable development as a good way of judging if a company is going to perform well in the long run. The Dow Jones Sustainability Index shows that corporations focusing on sustainable development outperform their peers over time.

Our working group on CSR is examining what corporations can do to alleviate poverty, and how we can utilize the markets and extend them to serve the poor outside the market economy. This is not an easy task. A concept called InSpire has been developed as the seed capital for start-up companies. We have also signed an agreement with the World Bank and are now jointly launching a course on the Internet. We have a virtual university and the World Bank has a distance learning network. We are jointly launching a course on CSR and business ethics. There is also a regional network of business councils for sustainable development in developing countries that are attempting to reach out to smaller and medium-sized corporations.

Business is, therefore, taking the issue of CSR and the question of poverty alleviation seriously for reasons of enlightened self-interest. This is because we believe that unless more stable societies are created, global markets, which are in the interest of businesses, will not be opened.

Adrian R A Court

Managing Director, Delphi International Limited, London, UK

I would like to establish the link between the work we do at Delphi and how it contributes, albeit indirectly, to poverty alleviation. In particular, I want to stress our role in supporting sustainable early-stage companies but first talk about the work we undertake in evaluating corporate activity from an SRI (socially responsible investment) perspective. This work attempts to determine the ethical, social, and environmental 'performance' of a company against values and criteria reflecting the investors' position on such issues. The SRI business is a fast growing trend, driven by investors, consumers, and others with a desire to influence corporate activity. It is now an established fact that instead of just getting a financial return from your investments, you can get social and environmental returns, which fortunately or unfortunately are not yet priced into financial valuation. And it is quite a big business—one in every 8 dollars in the US is invested in SRI funds of one sort or another amounting to around 3 trillion dollars. So one dollar in every eight is invested in some form of fund screened against some level of criteria.

These criteria fall into two categories—negative screening that discourages or rejects undesirable activities, and positive screening that 'rewards' superior social or environmental performance (Box 1). The screening criteria reflect the investors' values. These are often culture-specific and, therefore, not readily transferable. Some of these criteria applied in India would actually wish some of the companies to close their businesses.

The figures in parentheses are the number of times this particular activity is blocked out by a fund; thus 96% of funds have a negative attitude towards

Box 1 SRI (socially responsible investment)/Corporate responsibility screening criteria

- ■ Negative screens discourage involvement in
    - tobacco (features in 96% of SRI), gambling (86%), weapons trade (81%), alcohol (83%), industries with a negative environmental impact (79%)
    - other issues: human rights abuse/dealing with oppressive regimes (43%), labour exploitation (38%), support of birth control/abortion (23%), animal testing/welfare (15%).
- ■ Positive screens seeks superior performance in
    - environmental management (of risk, product innovation, eco-efficiency, and operations), health, and safety
    - relationship with employees, shareholders, members of the value chain, the community, and other stakeholders
- management of human capital—a new area of interest.

tobacco, which means effectively that one in eight dollars is not going to go into the tobacco industry. Things that might be responsible for poverty alleviation, such as labour exploitation, support of birth control or abortion have a negative screen in only 15% of funds. Positive screens, on the other hand, look at rewarding companies that have a positive attitude towards environment management. It is good to see that TERI is also looking at the eco-risk of companies—an interesting development for India. The relationship with employees, shareholders, members of the value chain and community, and other stakeholders is another important and positive criterion. An increasingly important criterion is the management of human capital. How do you retain intellectual capital, which is effective only on loan because people carry it around in their heads?

Let us see the link between corporate responsibility and poverty alleviation. Transnationals, by setting up a factory in a developing market, are indirectly doing their little bit by employing local labour, transferring jobs from Birmingham to Mumbai. This is a controversial enough issue, of course, for a transnational, having to defend the social impact of what is seen as an economically watertight case—outsourcing services from a developing country because costs are lower. Transnationals have learned, however, sometimes to their cost (damage to their brand image and loyalty) that this outsourcing has to avoid exploitation of the local labour force.

Coming to direct action, there is an increasing involvement by corporates in community investment (donations to aid education, health and welfare, and infrastructure development) and support for micro-lending and leasing. This direct action might be driven by social conscience but again it is found to enhance the brand image, for it has strong appeal to those consumers or investors committed to SRI. The driver here is the investor and the consumer's position on such issues, not only the corporate's view.

This investor and consumer pressure on large publicly quoted and leading brands to support poverty alleviation (directly or indirectly) is, in Delphi's view, not enough. We also concentrate on supporting private sector initiatives. We do this on behalf of socially responsible investors who are in a position to take the associated additional risk of investing in the private sector. Such investors seek to influence sustainable development and poverty alleviation more directly and want to see their investment actually achieving positive results. They want an investment vehicle, an investment opportunity. We generate such opportunities by helping early-stage companies and have developed a reputation for giving time and energy to the early-stage developmental projects and companies whose business model promises to deliver positive environmental or societal benefits.

In India, we were closely involved in the initiative of the World Bank that led to 20 million dollars being put on the table for Indian photovoltaic companies. The resultant project called the PVMTI (Photovoltaic Market Transformation Initiative) is doing its job in promoting the outreach of photovoltaics into the rural community and energy for the poor, a key requisite for poverty alleviation. We are also involved in a 'biomass-to-energy' project in rural India, which gives the farmer an incentive instead of burning agricultural and plantation waste, to deliver it as feedstock to an environmentally clean power project. Sadly, the project is in difficulty reaching financial closure, due to the associated risks.

I would like to end with a reference to the 'InSpire' initiative, supported by the World Business Council for Sustainable Development. This initiative has picked up the challenge to support start-ups offering a unique, sustainable business model and help them through the initial growing pains. We have identified a number of such start-ups and are structuring the support needed which involves setting up incubators and sourcing seed capital funds in partnership with a local investor/entrepreneur to invest in start-ups.

Tejendra Khanna

Chairman, Ranbaxy Laboratories Limited, New Delhi, India

I would first like to refer to Mahatma Gandhi's call to businessmen in several of his writings and speeches to regard themselves as trustees for society because, they essentially drew upon community savings to plough them into various business activities. His concept was that if a sense of trusteeship remained uppermost in the minds of people running businesses, they would always recognize the need to give something of real value back to society for the benefit of the people who had reposed their trust in them. This valuable concept underlies the philosophy of corporate social responsibility. Secondly, people feel that the main objective in the context of market competition is to make money. But again, as Mahatma Gandhi and leaders in the field of ethics and morality have said repeatedly, 'The ends and the means have to be in conformance.' Making money by any means is not an ethical way of running a business. I think it is extremely important for people in the corporate world to recognize their own social responsibility to conduct businesses ethically.

In the last couple of years, I myself have had occasions to participate in a number of apex national chambers of commerce and industry seminars on the need to restore ethics in business. In the long run, if you keep ethical values uppermost, businesses will flourish. Unfortunately, little business today is done ethically, with a sense of fairness for all the people that business is dealing with, be it the vendor or supplier or the banking system, the equity shareholders, the distributors or the people who are in charge of sales. Are we really treating fairly all the people that the business deals with? This is an important question. I think that in their own mission statements, corporates must keep in sharp focus the objective to deal fairly with all those they interact with. I would also like to draw attention to what Prof. Amartya Sen, the 1999 Nobel laureate in Economics, said. He said that in developing countries, we are particularly deficient in the amounts of public investments we make in the basic development of our human resources. We have in India one of the lowest per capita spendings on public health care. In public education, likewise, we have been highly deficient in making investments in our schools to eliminate gender inequity at the lowest level, and in enabling boys and girls to be educated to a level where they are able to acquire knowledge relevant to the sustenance of their own lives. In developing societies around the world, public budgets are in serious disarray because of severe revenue constraints. There are huge revenue and fiscal deficits staring us in the face, and it therefore becomes necessary to fall back on the corporate sector that must enter these fields to provide health care and educational services. Service industries with private investments in these sectors are now just beginning to develop in India. But this is something which will be required to be undertaken on a much bigger scale in the future.

There has been a reference earlier to the Global Compact launched by the UN Secretary-General in July 2000, and I am happy to say that Ranbaxy was one of the 19 Indian corporates invited to a meeting in December in Mumbai to launch the Global Compact movement among Indian corporates. Under the Compact, corporates, in accordance with their own commitment and mission statements, should voluntarily agree to comply and observe a set of nine obligations. These are categorized under fundamental human rights, essential labour rights, and the protection and upgradation of the environment by using environmental friendly technologies, etc. We felt that there was strong support from the Indian corporate community at the Global Compact launch meeting to adopt all of these obligations voluntarily, without waiting for national governments to put them down as statutory obligations. I am happy to say that Ranbaxy is functioning conscientiously as one of the leading Indian corporates, in terms of its ethical commitment to give back something to society, in consonance with Mahatma Gandhi's laudable exhortation.

Ritu Kumar

Director, TERI-Europe, London, UK

Why look to business for poverty reduction? One reason is the retreat of the state because of liberalization and decentralization. However, this does not mean that the state does not have a role to play; it does have a role of providing an enabling environment. It also clears the way for business to act more responsibly. The business sector has the power to alleviate poverty through the financial and technical resources at its disposal. It also has the flexibility to do so though this may more or less depend on whether the business is privately-owned or state-owned, or whether the enterprise is a small- or a medium-scale one. There is definitely a greater degree of flexibility in the business sector's engagement with the poor. Business is also faced by pressure from consumers and citizen groups demanding that they be more responsible, and so it must respond to these pressures from civil society. The corporate sector also has its reputation to worry about. Adverse publicity for many companies can be very debilitating for the corporate sector.

Some of the ways in which business can exacerbate poverty are grouped under four headings. One is exploitation, and this is more apparent in manufacturing industries such as garments, where a lot is heard about exploitation of labour practices, of child labour or forced labour, of wage payments, and of working hours. The second sort of adverse impact comes from exclusion. Very often, business activities exclude the poor from access to essential services like water, energy, and electricity. The poor may probably be willing and able to pay for these services but they do not have access to them. The third issue is that of expropriation, the mining sector or the dams are probably the most relevant in this context where land has been expropriated, especially from tribal and indigenous communities. The fourth issue is that of externalities, for example, due to industrial activity, air pollution, and water pollution. Here again, it is the poor who are affected most in terms of health impacts or contamination of water resources. Farmers in Tamil Nadu faced problems when industrial activity contaminated farm lands by waste water.

However, not all is black, for businesses can be more engaging and proactive. By adopting good labour practices, giving adequate minimum wages, and eliminating exploitative practices like child labour, businesses can have a positive impact on poverty. By adopting good environmental practices and maintaining high environmental standards, businesses can help in poverty eradication. By being more accountable and transparent, and by reporting what they are doing, businesses can also help in poverty reduction.

A business magazine called *Tomorrow* deals mainly with business and the environment. One of its recent issues cites the example of Nirma soap products, and the Hindustan Lever, which by adopting good environmental practices and processes, is now supplying goods with a better environmental content to the poorer sections of society. The business sector can become more ethical by providing goods to its consumers that are not shoddy and by not abusing their suppliers in the procurement of goods. One area where businesses can play a role is in improving literacy and providing education. It must engage with the state in an objective and positive manner in policy making, and a collaboration with other stakeholder groups to help eradicate poverty.

Some of the drivers and pressures on businesses are as follows.

1 Investment links with foreign investors and joint ventures
2 Trade and supply chain pressures
3 Demands from civil society and NGOs (non-governmental organizations)
4 Regulatory requirements
5 Leadership from a new generation of business managers.

The first two are more global pressures, coming from the supply chain and investment links with the foreign investors and joint ventures. The next three are more local pressures from society groups and NGOs, from regulatory requirements that might exist, and from a generation of emergent business leaders, who are more aware of the problems of the poor.

The challenge for Indian businesses is how they can combine these global and domestic pressures and respond in a comprehensive manner. The multinationals are faced by a different set of pressures while the small- and medium-scale enterprises are faced by another set of pressures coming from the supply chain. It is necessary for businesses to move from passivity to a positive response. The response of the Hindustan Lever to Nirma soaps is a case in point. There is a need for businesses to move from just the concerns of its shareholders to a wider stakeholder engagement. The time has come for businesses to engage with their stakeholders such as civil society groups in their areas of operation and the government. While there are many instances in India and in other developing countries of corporate philanthropy, a move is needed from corporate philanthropy to a more structured engagement of the business sector.

I would like to conclude with some remarks on what TERI-Europe is planning in the next two years to document corporate responsibility practices as they exist in three Asian countries: Bangladesh, India, and Sri Lanka. This is being supported by the Department for International Development, UK, through its Asia Regional Poverty Fund. To do this, we will carry out a survey and an opinion poll on corporate responsibility practices with the objective of trying to develop the basis for a home-grown, more strategic agenda on corporate responsibility. We will also be developing some sort of training and workshop modules, which will be used not only with the corporates but also with the NGOs and civil society groups. All of this will be done in partnership with different stakeholders.

Sophia Tickell

Senior Policy Advisor-Private Sector, OXFAM, Oxford, UK

OXFAM is an international NGO (non-governmental organization) working in 70 countries and part of an international federation of other OXFAMs. A year ago, Prof. Amartya Sen agreed to be our honorary President, and made it clear that the single most significant factor affecting population is women's education.

Despite rich cultural traditions, a strong living tradition of corporate philanthropy, and a thriving business community, large numbers of people in India are living in poverty. One of the things that has been missing in debate over CSR (corporate social responsibility) has been a developing country that says it would like to put this in order. Within India, there is a strong desire to give something back and this is going to make the critical difference in this debate. The influence of transnational corporations is felt not only on this sub-continent but beyond—in the production of cars, energy, medicine, and drinks, and through investment in the production of goods and services. It is a little difficult to comment on what could be done by transnational corporations. They not only operate the world market but actually play a central role in shaping it.

This year in Davos – sharply in contrast to last year's euphoria – saw a much more cautious approach. People admitted that there were some really big problems, and that poverty and climate change were issues that people had to focus on as well. Yet, it was heartening to note the spate of philanthropic responses at Davos. However, CSR and corporate philanthropy are not the same thing. Corporate philanthropy is important but it cannot be a substitute for ensuring that core activities do not contribute to poverty creation.

Here are some examples. First, the energy sector—oil, gas, and mining. The number of small-scale community projects that transnational corporations, oil companies, and mining companies undertake in communities where they get a licence to operate is overwhelming. Although these are important, these projects should not be seen as a substitute for ensuring that the social, cultural, and economic rights of the communities among which it operates are defined. It should not be an alternative to speaking out in the face of human rights abuse if protection of the company's installations was actually causing such abuse. If the core business forced eviction of families from their homes, it is due to reliance on armed protection. If a company fails to adequately compensate the contamination of crops or water supply, then no local community project will be a good alternative. Socially responsible companies pay attention to the details, particularly in respect of climate change.

In the retail and manufacturing sector, the problems are different. In key markets, a responsible company cannot take advantage of cheap labour to exploit workers who become little more than cogs in the wheel, are unable to gather to represent their views, are denied rest breaks and maternity leave, and education for their children. As to pharmaceutical companies, the donation of medicines to poor communities is a good start, as there are many who cannot afford medicine at all. But a socially responsible company will look at marketing practices in developing countries and in the light of people's vulnerability to diseases. This particularly applies to women. It will mean ensuring that intellectual property protection afforded in poorer markets commensurates with the people's ability to pay.

The private sector and transnational corporations in particular have come to command formidable power on the global stage. It is indeed surprising that of the top 100 economic entities in the world 52 are companies and 48 are countries. What this means is that some of the demands that were previously made on governments and countries are necessarily being transferred on to these phenomenally powerful entities. There is also today an unprecedented scrutiny of corporate practice. Technology and communications have transformed the demands for the accountability of companies and enabled people to ask that companies be held accountable in a way that was never possible before and that they issue accurate statements about what is happening in the developing countries where they operate. There is no hiding place, as somebody said. It is this combination that has led organizations such as OXFAM to mobilize public opinion in industrialized countries and in the South, to take these concerns to the financial community.

One of the questions likely to be asked of transnational corporations is, will planned production or market activities increase or decrease people's vulnerability? Will they make people more hungry or, will they bring plenty to the table? Will they take away their assets or will they add to them? Will it mean poor people having to make even greater sacrifices to afford medicines or schooling, or will it help to create an educated, healthy population? Will it mean working in inhuman conditions or will it give people dignity and income and will women, who bear the brunt of poverty, be better or worse off?

The world is now looking for answers to these questions and will judge companies on how they respond to them. The citing of harsh economic realities has been allowed to be an excuse for inaction for far too long. When people started publicly questioning companies on issues such as these, it became clear that no Chief Executive Officer was actually prepared to stand up and say, yes we are happy to put up with such necessary consequences as hungry people and their lack of access to medicines in the course of running our business. Apart from a few visionary exceptions, the majority of companies have to be dragged kicking and screaming into the unwelcome glare of publicity. Now, the communications tools to expedite this are available. The century is still young and the needs urgent; the world unfortunately is still too cautious; philanthropy will not suffice and must be built upon.

Summary of the questions-and-answers session

It was accepted that business houses bore a social responsibility towards the poor: to raise them above the poverty line and simultaneously mitigate environmental damage. A participant argued that since corporates were always on the lookout for profits, it made good business sense for them to increase their consumer base which, as regards India, lay in rural areas. If the rural people were not able to increase their purchasing power, then the corporates would not be able to enhance their profits. Therefore, it was very important for the corporates to work towards poverty alleviation and improve the condition of those who lay within the poverty bracket.

Leading corporate houses in the world are now adopting technologies that are environment friendly and do not cause serious damage to the environment.

Another discussion raised the issue of governments, civil society, and corporates working together. The government, by itself cannot achieve much, likewise for the corporates, and the civil society. The society that we live in is tripolar by nature, therefore one section of society will find itself incapable of achieving much by itself.

Businesses are being perceived to be more powerful than they actually are. Corporates, even the bigger companies, comprise people who are normal citizens, with concerns like everyone else. There is a tendency to view business as a creature *sui generis*, not populated by people.

India is fortunate to have traditional systems of medicine. In Vedic literature, almost 5000 medicinal plants native to India have been identified. Many state governments are trying to standardize some drugs derived from herbs and medicinal plants. Also, homeopathy, widely practised in India, is further strengthening its roots in the country. India has a national pharmaceutical pricing authority, which imposes compulsory price control on various kinds of drugs required for mass consumption.

Economic development has been used as an excuse for neglecting human development, which is very dangerous. Finance is the catchword in economic development, closely followed by social contribution and ethics.

Modern technology tends to cut back on human labour, substituting it with automatic machinery. In India, however, there is the labour-intensive small-scale industry.

The Chairman concluded the session by saying that corporate social responsibility was a reality. Corporates were expected to play a far more important role than they had been doing. The need for openness needed to be stressed.

Plenary session 4

Effective governance and communications for promoting sustainable development

Chairperson: Mitsuhei Murata
Panellists: Joanne M Kauffman, Brenda Gael McSweeney, Vinod Mehta,
Anita Pratap, Leena Srivastava

Chairperson's remarks by

Mitsuhei Murata, Former Ambassador of Japan, Tokyo, Japan

The information technology revolution has brought about certain deep changes in our societies. A significant consequence has been the increased role of individuals in policy decisions, thus heightening the significance of civil society in governance. We now hear of the birth of a global civil society and the advent of a new balance of power. However, a fundamental question remains to be answered: what should be the vision and consciousness of civil society? Without the latter, civil society could lack governance, becoming unfocused and unruly. We should bear in mind some visible aspects of civil decline such as high crime rates and the break-up of marriages and families. Considerable effort is needed to enlighten civil society.

In this respect, two aspects stand out. First is the search for common values and second, the enlightening and education of the citizenry. The search for common values is of utmost importance in view of the present disturbing situation around the world. The world is sick and this sickness is the outcome of a lack of three senses—a sense of responsibility, justice, and ethics. While the symptoms of this sickness are numerous, they must be remedied as soon as possible.

The symptom of a lack of the sense of justice is especially evident in the economy. The prevalent economy based on indicators such as gross domestic product totally ignores unquantifiable values such as family and community life, culture and tradition, environment and human dignity. The increasing disparity between the rich and the poor at the national and international levels and the destruction of the environment are among the more conspicuous consequences of this. Such gross domestic product economics must be replaced by the 'Gandhian economics' that takes into account the aforementioned essential if unquantifiable values.

Symptomatic of the demise of the sense of responsibility is the field of energy. The abuse of natural resources and dumping of hazardous waste materials expresses a total disregard for the welfare of future generations. This should not be tolerated. The use of nuclear energy by the military and civilians has proven to be very dangerous. The only remedy is the denuclearization of the globe because nuclear energy is incompatible with sustainable development.

And thirdly, signs of a collapsed sense of ethics. Laudable efforts have been made so far to remedy this internationally. I would like to mention particularly the contribution of the Inter Action Council, which consists of former presidents and prime ministers under the chairmanship of the former German Chancellor Helmut Schmidt. Its fruit, the Universal Declaration of Human Responsibilities, prepared by Prof. Hans Küng, is in line with our increasing awareness that rights need to be joined with responsibilities. This initiative must be followed up by animating a worldwide debate.

The importance of ethics cannot be stressed too much, for sustainability is an ethical requirement. The strong motivation necessary to attain sustainable development can be generated by ethical convictions.

With regard to the role of communications in promoting sustainable development, the education of the citizenry is critical. The advent of the new age requires a new education. Citizens are actually obliged to live in a network of serious dangers, including the impending crisis of extinction. New education should provide the necessary knowledge and capacity of judgement to overcome this crisis. The responsibility of industrialized nations is to globally disseminate such education by using their financial assets.

There are many important facts that experts know but do not voice. Experts know that nuclear technology cannot be distinguished in its military and civilian uses. Its civil use paves the way for its military use, as is happening today. Nevertheless, only nuclear disarmament is loudly called for while the abolition of civil nuclear installations is ignored. This situation must be remedied. The Chernobyl disaster[1] should have taught us a lesson. For the sake of humankind, the decision to denuclearize the world should have been made. Civil society must start a serious campaign in line with this. There are more than 430 nuclear reactors around the world today. How long can we expect to prevent fatal accidents from happening?

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[1] On 25–26 April 1986, the world's worst nuclear power accident occurred at Chernobyl in the former USSR (now Ukraine). The Chernobyl nuclear power plant had four reactors; in the testing of one reactor, numerous safety procedures were disregarded. A chain reaction went out of control creating explosions and a fireball, which blew off the reactor's heavy steel and concrete lid. The accident killed more than 30 people immediately. As a result of the high radiation levels in the surrounding 32-kilometre radius, 135 000 people had to be evacuated. It is reported that more than 5 million people continue to live in the regions polluted by radiation.

We are faced with two choices. The first is to start the denuclearization of the globe and the second is to be eventually forced into the first by a catastrophic disaster once predicted by the famous science fiction writer Dr Arthur C Clarke. He predicted during an interview an accidental nuclear explosion somewhere in Asia in 2009 and a resolution passed by the United Nations calling for total nuclear disarmament.

Good ideas and intentions to save humanity have long existed. What we need now is an idealistic goal. I humbly make a plea for the creation of a new spiritual civilization, based on ethics and solidarity, that respects the environment and the interests of future generations.

Joanne M Kauffman

Assistant Director, Center for Environmental Initiatives, Massachusetts Institute of Technology, USA

Effective governance and communications are two of the major components of sustainable development—the *sine qua non*, if you will, to ensure progress towards sustainable development. I represent both an academic institution and an academic alliance committed to participating in this great global enterprise, which is aimed at focusing progress on human, rather than purely economic, development. Given the world's present and projected population, this paradigm shift in the way we conceive of progress was essential for continued development towards a better way of life for all people on earth. Today, there is growing acceptance of the concept of sustainable development—we know that economic development cannot progress without due consideration of the environmental resources on which growth depends, nor by ignorance of social responsibilities associated with promoting human development. Despite recognition of this need, the concept remains somehow elusive. How, one may ask, can we hope to promote sustainable development when we cannot define it? How do we put into operation policies and institutions to guide development when we cannot specify its components beyond somewhat vague notions of providing for growth today without compromising future generations?

The academic alliance I mentioned is the Alliance for Global Sustainability, in which three major technical universities have agreed to work together on a global basis on projects that transcend political, national, and disciplinary boundaries to address the barriers and constraints to sustainable development. These include ensuring clean air and water, enhanced mobility, food, and improved health throughout the world. We work in partnership with other academic institutions, industry, and governments around the world, including TERI, to address these concerns in a multi-disciplinary, multi-geographical context. All the joint research projects are intended to be policy-relevant in that they must respond to global challenges with practical, feasible, and implementable solutions. Our model for the production of such knowledge is represented by a pyramid that moves from basic research to develop understanding of contemporary and emerging problems, to the development of methodologies and frameworks for decision-making, to a component that is radically new for most academic institutions—outreach and implementation.

Most academic scholarship concludes at the third level with publication of results and debate within the academic community. By taking a step beyond, our alliance is committed to working with stakeholders throughout the process and striving to ensure that the results of our research collaborations find their way into the hands of those who can best use them. We are looking for ways to enhance interactions with stakeholders throughout the world and with agents of change for sustainable development—business and industry, NGOs (non-governmental organizations), and governments. In carrying out this work, especially as we approach the implementation phase, it is clear that the highest hurdles to progress towards sustainable development are not found in science and technology. Though important in building an understanding of the challenges we face and in developing effective solutions to those challenges, science and technology will provide no solutions without effective governance and good communications to promote and disseminate solutions.

Effective governance for sustainable development

There are characteristics of effective governance that apply to any policy area concerning public good. Though currently the economic trend is away from state intervention and towards a market forces paradigm – one closely associated with the win-win promises of that other vague concept, globalization – it is important to remember that markets do not function in a vacuum. With regard to sustainable development, clearly market forces must be tempered by good policies, laws, and institutions capable of guiding development towards a path that is in fact sustainable and contributes to an improved quality of life for all. The market and the state need to complement each other. The infrastructure for good governance includes policies, legal instruments, and a capacity to implement and enforce laws that promote technological development, that provide good educational opportunities for citizens to ensure a competent and competitive workforce and their own personal development, and that contribute overall to social welfare.

With respect to sustainable development specifically, the government has a particularly strong role to play. The linkages among environmental conditions, poverty, and human welfare are complex. It is, however, clear that environmental degradation disproportionately affects the poor in developed and developing countries alike. As Scott (2001) noted, 'Mainstream economic thought promises that globalization will lead to a widespread improvement in average incomes. Firms will reap increased economies of scale in a larger market, and incomes will converge as poor countries grow more rapidly than rich ones. In this win-win perspective, the importance of nation-states fades as the global village grows and market integration and prosperity take hold'. The evidence, though, paints a different picture. While average incomes have been growing, so has the income gap between rich and poor countries and between rich and poor within countries as well. Among the contributing factors are the loss of natural resources upon which development depends, the lack of property rights to promote better management of these resources which act as safeguards to development, and a lack of empowerment of the poor due to inequitable knowledge sharing and unequal distribution of costs and benefits of environmental degradation. It is to overcoming these hurdles that governments must turn their attention both to protect the environment and improve human welfare.

A few specific measures to consider, which have been identified by the World Bank and others (World Bank 2000), include bringing environmental considerations into all planning for development; providing incentives and support for the private sector in setting and achieving goals for economic growth that take account of the need to protect the environment; and developing an interest in and capacity for addressing regional and global environmental issues. The latter is important for bringing countries together to address common resource problems and to find means that will build capacity in poor communities to understand how those issues impact their lives. The World Development Report (2000/2001) grouped different dimensions of poverty as opportunity, empowerment, and security, which could serve well as goals for effective governance (World Bank 2001).

Communications for sustainable development

In order to implement policies and build institutional capacity to advance such goals, it is clear that unprecedented communications among and between peoples and institutions will be necessary. The Alliance for Global Sustainability has supported over 50 multi-disciplinary research projects aimed at developing tools and methodologies for dealing with sustainability issues at local, regional, and global levels. We have trained our sights on meeting basic human needs for energy, mobility, and water and food while not losing sight of the relationship between meeting these and the phenomenal rise of mega-cities, particularly in the developing world, nor of global environmental challenges such as climate change that may exacerbate such problems at local and regional levels. However, if the tools that we are developing are not put in the hands of those who can make most effective use of them, the task would fail. We are thus engaged in a broad study of the value of knowledge for sustainable development through which we are trying to understand barriers to knowledge acquisition and use and to develop means to improve knowledge sharing for sustainable development. We are working with the World Business Council for Sustainable Development, Switzerland, to identify ways in which the knowledge being generated can contribute to enhanced innovation.

A component of this work focuses on the role of IT (information technology) in promoting sustainable development in both a business sense and across great divides. Certainly, differential access to IT has heightened awareness of socio-economic gaps worldwide. The divide between rich and poor in terms of access to web-based information and knowledge systems is certainly stark. Consider disparities in spending for popular access to the information tools that are so fundamental to participation in the so-called 'global economy'. As Professor Choucri has pointed out, the United States devotes 10%–12% of its economy to computer hardware and software and spends about US $3000 per person per year on computers. Bangladesh spends US $3 per person—a fact that reflects the implications of prevailing inequalities worldwide (Choucri 2000). From such realities it is tempting to draw the conclusion that the non-Internet world is being marginalized but the empirical record is substantially more complicated. While IT access does tend to run along the fault lines of inequalities among and between societies, it can contribute to empowerment in social, political, and economic terms.

At the same time, we cannot expect this optimistic portrayal of the Internet and other IT-based tools to act as panaceas for changing our world. One of the overriding issues is the need to separate information from knowledge. They are not the same and making web-based tools available without addressing the underlying barriers to knowledge will lead to little in the way of improving human welfare.

Barriers to knowledge

First, there are infrastructure constraints; not only of the kind just mentioned but also in terms of educational and institutional infrastructure.

Second is the limited local content available for use in web-based tools. This not only has a negative effect on poorer communities but also limits our understanding of the problems these communities face in meeting their needs and limits the ability to formulate robust policies for meeting those needs.

The language of the Internet is English and the constraint this adds to knowledge sharing is obvious.

Indeed, there has been an explosion of information available worldwide. Such an explosion of unfiltered information contributes little or nothing to sustainable development.

Finally, there is the complexity of sustainability itself. The issue in ensuring better communications for sustainable development is thus also a question about managing complexity or complex knowledge.

Improved knowledge sharing for sustainable development can be based on the following strategies. First, think of cyberspace not as a means to an end, but rather as a policy domain that must be addressed by bearing in mind the same goals that we would have for any policy to affect common good. In this context, in developing strategies and policies to improve knowledge sharing, we should not think of it as providing information – or as a one way street – but, rather as a means to give voice to actors across the divides and providing new leverages or tools for them to raise that voice. This is essential for knowledge sharing as opposed to information provision. Clearly, we need to find means to provide a more level playing field to provide greater access to knowledge. In this context, we may think of developing tools that make the sharing of knowledge more feasible and rapid—narrowing time and reducing the cultural and social spaces that now divide communities. Finally, to optimize knowledge sharing for sustainable development, it is necessary to devise means to enable globalization. But at the same time, we must pay heed to the need for localization as well.

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Defining effective governance may require some debate. However, communications play a major role in effective governance and the quality and source of information is of critical importance. Free media, whether electronic or print, public hearings, and key legislations such as the right to information help ensure reliability and are means of two-way flow of information between the public and the Government at national, state, or local levels.

Free flow of information is crucial to mould how global citizens relate to institutions of global governance. When we speak of sustainable development, we are speaking of a rights-based vision of people-centred development meaning that both women and men must have a voice and real participation in government. Transparency, social accountability, and public voice are inextricably linked and are at the heart of true participatory democracy. Citizens have the right to be informed of all of that affects their daily lives as well as the right to access relevant information that affects their interest. This includes information on how natural resources are being exploited and what investments the government or institutions of global governance are making, allegedly on the citizens' behalf.

Effective governance for lasting or sustainable development requires that environmental concerns are mainstreamed into developmental programmes, and this requires strong civil society. This encourages people's empowerment in managing all forms of natural resources including knowledge. It is fascinating that many ancient forms of governance focus on caring natural resource management. In this century, we are struggling to re-establish that relationship between our governance systems and the maintenance of ecosystems. When armed with quality information – demystified and easily accessible – people can exercise their rights, engage in debates, and generate alternative solutions to the many seemingly intractable and insurmountable problems. The Government of Madhya Pradesh has demonstrated the value of people's management for ecological restoration. Approximately one per cent of India's land area, i.e. 2.9 million hectares, is being greened across the state through watersheds managed by the community. The success is the result of hard work and creativity. We may bear the burden of systematic destruction of our globe's bounty but it is the poor, especially women (given the role society assigns them) who bear a disproportionate share of this burden. Low-income women are the hardest hit whether by deforestation, water shortages, pollution, or any of the host of environmental ills that hit us daily.

I would like to highlight another set of special circumstances that the income-poor face (income-poor because they are certainly rich in cultural tradition and other values). They face special dilemmas in the context of communications and access to information. There are two critical aspects to communication—from below in terms of viewpoints and priorities, from above in terms of what the leaders are typically doing. However, most of the communication between the two is indirect at best. Electronic media in all its variations, the latest information and communications technologies, or more traditional radio and newsprint play a vital intermediary role. Prof. Amartya Sen,[1] the great son of India, very forcefully set out this notion of how free media and good governance move us forward on the path to sustainable development. In the wrong hands, though, the potential distortions of information can set us back by years, even decades. The language of the government and major media in many developing countries is foreign to most of the population. If people need critical information on land resources and records, etc., they require time and money to access it. Even if it is available in their own language, it may be written and people may be illiterate and still cannot access.

Even where local government systems are in place and give people a chance to voice their concerns, the excluded still have to overcome other barriers, namely of the social norms that restrict their right to speak in public. Programmes are needed to address these daunting challenges. Apart from programmes on capacity building aimed at strengthening certain key skills or institutions, a number of schemes focus in innovative use of technologies whether traditional or modern to facilitate rural communication. Community radio seems to have been overtaken by information and communications technologies. Such as low-orbit satellites or village-level Internet connectivity. Experience shows that lack of information can kill just as effectively as hunger. Expropriation of land or removal of common property rights over key resources such as water can be destructive. Decades earlier, the women of Chamoli forcefully demonstrated this. They hugged trees in the celebrated Chipko movement;[2] media coverage made it a vibrant environmental campaign in India.

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[1] A distinguished economist, best known for his work on poverty and famine, Prof. Sen was awarded the Nobel Prize for Economic Sciences in 1998 in recognition of his contributions to welfare economics, including the axiomatic theory of social choice, definitions of welfare and poverty indexes, and empirical studies of famine. Prof. Sen is the Master of Trinity College, Cambridge, before which he has been Professor of Economics and Philosophy at Harvard University and held professorships at Oxford University, Delhi School of Economics, and Jadavpur University.

The UNDP (United Nations Development Programme) is working with communities in Johad watershed areas in Rajasthan's Alwar district. Participatory approaches to create sustainable watersheds, rainwater harvesting, and check dam techniques have revived dried-up streams to create little oases throughout the area. The success of such initiatives brings up the issue of community rights and control over allocation of resources such as perennial water. Communities need the ability to negotiate their rights and this is linked with access to information. Looking at the urban arenas, slum communities have a scheme in place called the urban settings environment rating system that has helped empower them by public communication on performance of the municipal bodies. Public pressure response models on the government bodies has pushed them into accepting accountability requirements. They now need to publicly declare key environmental information.

Another popular scheme is the green rating of Indian industry. Surprisingly, industries took this up voluntarily and did not mind competing for ratings. Such voluntary public disclosure of environmental performance encourages industrial improvements. We see greater public awareness, a wider range of choice, increased empowerment for investors and consumers, and a more balanced progress towards sustainable industrial growth. Green rating is an innovative attempt and has succeeded in presenting a market-oriented framework through public disclosure and communicating environmental information and performance. The media's role is critical for creating awareness, boosting participatory democracy, and widening the debate around this environment–poverty nexus. Not enough commitment and resources are directed to these so-called soft issues. The dream of bringing the media and peoples' voices to the forefront must be a crucial goal in mega forums such as the Delhi Sustainable Development Summit.

Vinod Mehta

Editor, *Outlook*, India

This conference is being held against the backdrop of a great human tragedy in Gujarat, the feedback from which suggests that while the earthquake could not have been prevented, the extent of its devastation could certainly have

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[2] A people's movement dedicated to the conservation, restoration, and ecologically-sound utilization of the natural resources of India's northern state of Uttar Pradesh, it gathered momentum in the 1970s and 1980s when the destruction of forests spread rampantly throughout India. A result of hundreds of decentralized initiatives, its leaders have primarily been village women, acting to save their means of subsistence. The name comes from the Hindi word meaning 'embrace'. Villagers, especially women, saved the trees by hugging them.

been contained. Ahmedabad and other parts of Gujarat are now witnessing fast economic growth with a great influx of money and industry and a big demand for housing, which has encouraged a great explosion of real estate agents. All the building and zoning laws in Ahmedabad were in place but flouted. Though it was illegal to build more than two or three storeys, buildings with 10 and 12 storeys abounded.

The media has been criticized for having concentrated too much on the grisly aspect of the calamity. I feel that we have done a great job in presenting to the people the day-to-day horrors and the mismanagement. We have shown and will continue to show how easy it is for unsustainable development to flourish when everybody looks the other way. I hope we can show that there was almost criminal and callous neglect in this regard. Gujarat can become a case study and provide pointers to how unsustainable development can suddenly appear in a state where every conceivable law exists.

India is a great country for laws; there is a law for everything. The problem is with their implementation and monitoring. One of the paradoxes of this earthquake is that although there has been a great human tragedy, it has also been a great wake-up call in many ways. The creation of a new national disaster management committee has been on the files for almost 10–15 years. I have a feeling that once this earthquake is over, it will continue to remain on the files, unless of course we have another tragedy.

It is puzzling why the drivers of development – generally large corporations, business houses, and civic bodies – fail to communicate a case, and a very good case at that, that they may have. The most outstanding example of this is a dam project in India, the Sardar Sarovar dam.[3] The state governments and central government, are all for the dam, and pitted against them are a group of NGOs (non-governmental organizations), some activists, and a few intellectuals. In the propaganda war, or in the communications war, this motley group has stood against the government. They have put their case forward effectively while the government and the big business houses who are building the dam have been ill-equipped and ineffective in communicating a good case. The dam has much in its favour as it will greatly benefit two or three states. However, the war has been won by the other group.

It is interesting to examine the success of these people with limited resources, no great expertise in communication, and no capability to hire advertising agencies, or political lobbies. Perhaps, it is because they communicate on a very personal level by going from office to office. One of the reasons for the failure of government efforts may be the inability to connect with the idiom of the people despite possessing the grammar and the tools to communicate. How does one communicate with tribals who are going to be displaced? Television programmes in English will fail hopelessly. Big advertising agencies and lobbies have no way to communicate with the people who are affected, because they, by and large, communicate in English. Communication through huge advertisements and articles in the *Times of India*[4] will not help. Experts in the field can find a way to communicate with those most affected.

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[3] The largest and most controversial of major projects planned by the Narmada Valley Development Authority, this encompasses 75 000 km of canals meant to irrigate a command area of 1.79 × 106 hectares of cultivable land in Gujarat and provide hydroelectric power to the riparian states. Estimated to cost approximately 4 billion dollars, it promises to bring drinking water to 30 million persons. If, and when, completed, it will flood more than 37 000 hectares of forest and agricultural land, displacing more than half a million people and destroying some of India's most fertile land.

In India, the problem with the reforms process or any kind of development is that the people affected have no idea of what development really means. It is a top-down phenomenon. It is imperative to find a way of communicating with people. It is certainly true in India that wherever governments are pitted against NGOs and activists, the latter win hands down in putting their case forward. Why do governments fail despite their good and useful projects? In public debates, one side puts forward all the arguments while other remains silent. To get someone from the government to speak up on controversial issues is virtually impossible because everybody passes the buck by saying that he/she is not supposed to talk on the subject.

We must take a holistic view of development, and find a way to communicate with the people affected, mostly for the worse by displacement, joblessness, etc. We have to communicate to them the merits of our admittedly time-taking endeavours. New ways to do this must be discovered.

Anita Pratap

Freelance filmmaker and journalist

Today's newspaper carried a front-page report about 25 schoolchildren getting seriously injured in a bus accident. The accident happened because the bus driver was not qualified to drive. This is absolutely ridiculous. Is it not common sense that drivers should have proper licences and be qualified to drive before driving anybody, let alone schoolchildren? This incident demonstrates that we are an irresponsible civil society. Supreme Court guidelines have in fact been issued on this specific issue owing to another nasty bus accident, where a school-bus fell off a bridge and the children in it drowned in the Yamuna river. There was such a hue and cry after that incident that the Supreme Court had to issue guidelines on a matter of common sense. Yet, one year after that, comes another similar tragedy.

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[4] *The Times of India* is India's most widely circulated English daily, rated amongst the world's six best newspapers and attracting a daily circulation of over a million copies.

When we are incapable of doing the right thing on a matter of personal safety, how can we expect civil society to do the right thing in the context of sustainable development? Over the last 30 years, there have been so many conferences where sustainable development has been highlighted most effectively. We know what is going wrong; in a lot of cases, we know how to fix it, but we are not capable of doing so. We simply don't bother.

Take the recent breakdown of negotiations in The Hague. We know what should be done, we know that polluters must pay, they had even agreed to do it, but 10 years after Rio, where are we? At an individual level, if we are not capable of safeguarding our own personal safety, how are we going to take up larger, societal, community-based, global issues? If we do not want to do something, no conferences and lectures will help us do it. Laws won't help. Court directives that reinforce laws won't help. What will it take to get us to do the right thing? What is the way out? There is only one way out – there is only one solution and that is to start a campaign to build moral character.

We act only when disasters strike. Many speakers have mentioned the Gujarat tragedy. I covered one earthquake that hit Latur, Maharashtra, in 1993.[5] The same issues were then in focus. Journalists not only talked about the human tragedy, the death, and the destruction, but also about the need for proper building regulations and materials, concepts of disaster management, timely interventions and so on. For a while, there was soul searching committees were set up, and faults identified. There seemed to be an improvement in the situation, and then complacency set in. Things slid and deteriorated till another major calamity struck.

I may strike an alarmist note but nothing will happen unless the lack of sustainable development erupts in a tragedy. The way out then really is character building. Unless citizens bring a quality of morality to every action, there is no hope. We will keep blundering from one tragedy to another.
We cannot think in terms of solving immediate problems, let alone larger global problems that will arise in 10–15 years or 100 years. Global warming is going to drown the Maldives in about a 100 years. The only answer is a paradigm shift in the way human beings think; if that can be changed fundamentally, then something may work out. In the Hague, there was no sense of

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[5] On the morning of 30 September 1993, an earthquake measuring 6.3 on the Richter Scale rocked the districts of Latur and Osmanabad in Maharashtra. Dwellings in 52 villages turned to debris. Almost 10000 persons lost their lives and 130 000 were rendered homeless. In adjoining Karnataka, 9 people were killed, 16 000 injured, and 30 000 houses destroyed.

responsibility or justice. So the whole effort, months and months of preparatory work, was wasted.

Moral foundation should be given in schools. Morality does not mean religious instruction. Character building should have absolutely no religious connotations. This is not a programme to worship deities. This is a programme to inculcate values—courage, truthfulness, protection, compassion, responsibility, fair play, equality, and justice. When I was a child, I had to learn moral science; it is not found in the school curriculum any more. If we could inculcate morality in our schoolchildren, they would carry it on through life. In this, the media can play a tremendous role. It can contribute to making it politically correct and fashionable to be moral-thinking citizens with a social conscience. Perhaps, there could be a green rating for the media, not just industry. There could also be a moral rating for the media. The media today is so focused on the glitterati and the chatterati, and have made these tremendously fashionable. It can also make morality fashionable. However, when it comes to sustainable development, the issues seem so abstract that journalists who need specifics cannot grasp them. Researchers, intellectuals, and other agents of sustainable development must bring specific examples to the attention of the media – for instance, a specific project that demonstrates how effective sustainable development is or an example of an area devastated by the lack of it.

It is tough to report concepts but specific examples make good stories. But there is a caste hierarchy in the world of journalism. Breaking news or current events are the top of the heap, they occupy the status of brahmins.[6] Unfortunately, development-related issues are like the dalits[7] of our system. Journalists believe that these are soft and boring stories but there could not be a greater lie than that. The fact is: there are no boring stories, only boring story-tellers. The problem is that journalists are unable to communicate these stories in an interesting fashion.

Not much skill is needed to talk about the human tragedy in an earthquake situation; history sells itself. However, good communications skills are imperative to reporting development issues. This problem could be addressed in schools of journalism by teaching young students the skills to make their stories interesting. Advanced workshops for promising journalists under 30 could also provide such training. Public interest advertising also holds tremendous value; it could be the ideal means of propagating information on sustainable development.

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[6] The Hindu caste system is one of the oldest forms of social classification in the world. It divides society into four castes – brahmins, kshatriyas, vaishyas, and shudras (or dalits) – the former three clubbed as the higher castes. The 'brahmin' caste was supposed to perform priestly duties and officiate at Vedic ceremonies and rituals. Members of this caste acted as intermediaries between humans and gods. They lived apart from society and were called upon when ceremonies, sacrifices, or other rituals needed to be offered. In exchange for their services, brahmins received donations and were exempt from taxes.

[7] The 'shudra' (or 'dalit') caste functioned as the servants of the higher castes, performing work that often brought them in close contact with impure or contaminated aspects of society like leather making, corpse cremation, garbage collection, or even disposal of animal/human waste.

I will give you a small example. I was with my parents having lunch, and watching the news on the national channel. A public interest advertisement showed a family completely engrossed in a cricket match on television when the doorbell rang. They were officials from the census department. When the family attempts to chase them away, an insert comes on saying that the census is a public responsibility and all it takes is two minutes of the citizens' time. The family then agrees to give the requisite information. Believe it or not, we had just finished lunch when the bell rang—it was the census officials. My father's first reaction was to ask them to come later. Then we just looked at each other and burst out laughing. The situation was exactly like the one in the advertisement. It took just two minutes of my father's time to give them the information and they went away. If that advertisement had not come at the right moment, my father would have turned them away. The value of such public interest advertising is immense. It must be short but done well to communicate the message effectively.

A critical problem with the people involved in development issues is that they tend to be bad communicators. Perhaps the wrong people are doing the communication. They cannot do it with any conviction. Why are the Narmada dam activists[8] so effective? It is because they feel that they have taken up a cause, which they are communicating. Often, institutions such as the United Nations have goodwill ambassadors some of whom are very effective. Most of them are celebrities, which is why they are taken. Great movie stars or cricket stars voice messages and sometimes it works well.

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[8] For almost two decades, activists in India have been protesting the massive Narmada Valley Development Project, meant to be one of the largest construction projects in human history, involving the erection of 3200 dams in the Narmada river basin over the course of a century. Its centrepiece is the Sardar Sarovar Dam, stretching 4000 feet across the river and rising to the height of a 45-storey building, making it the largest water development project in India, and possibly in the world. The multi-billion dollar venture is intended to irrigate nearly 4.8 million acres of farmland and bring drinking water to 30 million people. However, its construction would also uproot almost half a million people living along its banks and in surrounding communities, many of them indigenous people known as adivasis. Many of them are subsistence farmers and cattle and goat herds.

Numerous hunger strikes, demonstrations, and lawsuits by local populations and interventions by the Indian Supreme Court have marked the yet-undecided process.

Princess Diana[9] was an excellent communicator but not all celebrities are. Just because they can act or bat well, it does not follow that they can talk well too. Often the message is completely lost. My appeal to such institutions is to instead take people who believe in the cause and will therefore be able to communicate convincingly. To get a point of view across, the person must have excellent communications skills and deep conviction.

Leena Srivastava
Director, Regulatory Studies and Governance Division, TERI, India

When talking of development, the primary concerns are an improvement in the quality of human life and also the generation of opportunity by fostering peace, security, and socio-economic development. When talking of sustainable development, considerations of the environment and natural resources must be included. Social development which incorporates inter-generational equity should be expanded. It is important to remember that sustainable development is enabled only by a supportive governance structure.

Effective governance comprises educating, recognizing, empowering, facilitating, commitment, and demonstrating. Education must go beyond mere literacy enhancement. People must be educated about social responsibilities as well as about opportunities available to them. This is something that people have to do for themselves to a certain extent—taking up opportunities for self-development, for employment, and to volunteer for social causes such as taking education to a larger segment of society or working on environmental and social causes.

We need to recognize the needs of the people we govern and the goals set against each of these needs. We need to recognize the possible solutions and the likely constraints to these solutions. We also need to recognize the alternatives available if the best solution is not available or accessible. With eyes wide open, the roles and responsibilities of each segment of society, including government, industry, and the people, must be delineated.

On the issue of empowerment, the aspects to be considered are the devolution of powers and responsibilities, information and communication, capacity building, and the design of mechanisms that allow different sets of people to participate in governance structures. Though we talk about participative governance, the mechanisms for it are missing to a large extent.

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[9] Diana was the Princess of Wales owing to her marriage to Prince Charles Philip Arthur George, heir apparent to the British throne. Apart from her royal roles and responsibilities, she was also the president or patron of over 100 charities. She did much to publicize the plight of homeless and disabled people and children and adults with HIV/AIDS. She was an active campaigner for a ban on the manufacture and use of land mines. She was also a patron of the English National Ballet, the Leprosy Mission, and the National Aids Trust and President of the Hospital for Sick Children.

Facilitating is grouped into two broad areas—providing enabling frameworks and access to resources. Enabling frameworks span an entire gamut of issues. Coordinated policies across various sectors of the economy and different levels of government help in creating an environment where forthcoming investments generate economic activity and associated employment. While the government does not necessarily have to provide the infrastructure, it can definitely facilitate the provision of it. A clear vision is essential for doing so. In providing access to resources, the emphasis is on knowledge, information, technical expertise, and financial and human resources.

Commitment is an important ingredient. There must be a clear vision of the direction and the goal of development and partisanship must be avoided. Irrespective of which government is in power, it must be followed. There is also a need to bring about transparency and accountability in governance. In India, accountability is missing in the allocation of resources and the planning process. Very rarely does the public come to know how the budgetary resources have been utilized and to what extent the targets have been achieved. Commitment to institutions such as the law is also indispensable. These institutions must be allowed to function effectively.

Demonstrating by good leadership is important. The current electoral processes need rethinking. There is talk of having clear qualifying criteria for candidates standing for election but it would also be useful to provide profiles of the candidates to the voters to enable them to make informed choices. Elected leaders should demonstrate their commitment to the development vision. We continue to formulate the same strategies and prepare the same planning documents without really implementing them. We must show efficiency in practising what we preach. It could help us go a long way in moving towards sustainable development.

Summary of the questions-and-answers session

Exchange of knowledge is different from information dissemination and implies an ability to exchange knowledge at different levels, and with several approaches. One way is developing software, and there are organizations for this in both developed and developing countries. India, for example, has a sophisticated and developed software industry. An organization called Honeybee Network focuses on the exchange of tacit knowledge. This software development will enable people to transcend language barriers. The other are two-way knowledge exchange finding devices that do not disseminate information.

Plenary session 5

Financing sustainable development

Chairperson: Ian Johnson
Panellists: Andrew J Bennett, C Ramachandran, Nick Robins

Poverty: the global challenge for governments, industry, scientists, and civil society 79–90

Chairperson's remarks

Ian Johnson, Vice President, Environmentally and Socially Sustainable Development, The World Bank, Washington, DC, USA

The financing of sustainable development can be discussed under six broad areas. The first is environmental taxes and levies; the second, and perhaps the most important in this new age, is creating markets for sustainable development; the third, property rights; fourth, information; fifth, the rise of a new ethical understanding of investment by social and environmentally responsible corporations; and finally, public finance. Environmental problems and sustainability issues in general have traditionally been dealt with by command and control. For example, the government may set permissible levels for emissions of sulphur dioxide, establishing penalties for firms that exceed them. This approach does generate finance – firms invest in abatement, pay fines or may even go out of business – but it can be an inefficient way of dealing with environmental problems. More efficient approaches to the environment rely heavily on markets to send the right signals, together with the right levels of finance allocations and right responses.

Taxing pollution emissions has two desirable properties from the viewpoint of financing sustainable development. First, pollution taxes provide an economic incentive for firms to find cost-minimizing solutions to emissions reductions. Second, the revenues generated are available, at least in principle, to finance the monitoring and enforcement operations of environment ministries, which are often scarce in developing countries. China, for example, developed a pollution levy system for emissions, which, since 1997, has generated about 15% of the capital requirements for pollution control. The other side of the taxes coin is the removal of subsidies.

Subsidies for environmentally damaging materials such as fossil fuels have the effect of not only draining the treasury but also of encouraging their overuse. In 1996, fossil fuel subsidies in developing and transition economies amounted to almost 50 billion dollars. Another significant part of sustainable development includes water resources and their management. It is estimated that in financial terms, there is a 50% subsidy on water worldwide, and if the economic costs are considered, the subsidy is even larger. Reducing subsidies can have a profound effect. For instance, in China, the subsidy reform programme has led to a situation where now 80% of the coal is sold at the international unsubsidized price. As a result of that, the energy intensity in China has decreased by 30% since the mid-1980s, when there were significant subsidies.

The issues of creating, developing, and promoting market-based instruments and markets for sustainable development are exciting. Markets are by and large beneficial to any kind of development. They allocate scarce resources efficiently to the highest rates of return and they clear supply and demand effectively. But for someone interested in sustainable development, they have two potential drawbacks. The first is that markets are short-term regulators and many of the issues that we are confronting are long-term ones, sometimes 10- and even 50-year issues. The time-frame for climate change may be still longer. But markets can be very myopic, often taking a short-term view. Second, markets by definition do not reflect non-market goods and services, so they are left to their own devices and are not good at capturing the ecological services provided by water, the biodiversity services provided by forests, the climate change effects provided by land-use, land-use change, forestry, and the like. This, however, is not a rejection of markets, but a plea for some creativity in public policy markets and a call for market instruments that affect longer-term issues of sustainable development.

If, for example, a way of setting a price for carbon could be found, where logging companies with every incentive to rip down trees today could be transformed into sustainable forest management companies without harm to themselves, then market-based instruments could actually be used to make private companies dealing in the forestry sector see forests and their conservation and management as assets. The World Bank has been working on a prototype carbon fund, a fledgling scheme to try to reduce carbon emissions. It intends to look at verifiable certificates that would have a value and therefore encourage companies to invest in reducing emissions. For an active market in carbon, climate change treaties must develop more substantively, but in the absence of that public policy instrument, there is very little incentive to invest in a carbon market.

In India, for example, village rights to local forest resources have reversed the deterioration of forests in many states. For decades, government-owned forest resources restricted the legal use of these resources by local communities. The result was a rush of illegal logging and fuelwood harvest with no concern for sustainable use, since the communities involved had no secure stake in future production. Granting usage rights and the creation of community forest management institutions which embody the property rights of the community has led to far more sustainable use of forest resources. The issue of property rights deserves greater attention.

Information in today's age is easier to come by than ever before and, therefore, simply publishing data on local polluters can create community pressure to clean up. Ecolabelling permits consumers to express their preferences for more environment-friendly goods. Providing information can be a more cost-effective way than very elaborate regulatory approaches with heavy demands for monitoring and enforcement. In Indonesia, firms rated by their emissions have not achieved what pressure from communities and civil society has in 'blacklisting' companies that fail to meet standards. Information can affect consumer power as well as investor power tremendously. Information has also resulted in a large growth of ethical investing, and associated mutual funds in Organisation for Economic Co-operation and Development countries. A part of those funds should also be channelized to developing countries for ethical investment purposes. Electronic trade has meant that investment funds can move far quicker now; people are being empowered to take decisions about which companies to invest in based on their environmental ethics and sustainability. Several far-sighted companies are adopting a new corporate compact—the triple bottom line for very hard-nosed reasons. They believe that meeting the triple bottom line of social, environmental, and financial accountability will lead to acceptability in civil society and that they will be in business for a longer time in terms of profitability and growth.

To think that everything will be accomplished by the private sector is an illusion; there is still a role for public finance at the national and global levels in joint venturing with private capital, particularly in innovation. Public finance can be used for the public good in areas with long-run social returns and for risky projects. The GEF (Global Environment Facility), for example, created to deal with climate change, biodiversity, ozone depletion, and the International Waters Facility have been instrumental in trying to reduce some of the upfront costs of renewable energy; their role is only going to increase over the years. In many cases, however, the early costs are high, and markets are unlikely to take those costs on board. Public finance, from the GEF in this case, can contribute the extra costs judiciously, to create a level playing field and make a difference.

In a country like ours, proud of its achievements in agricultural productivity, we are living off the intellectual capital of the Green Revolution and not investing sufficient public finances in agricultural research. Thirty years ago, 90% of the financing for agricultural research came from the public sector and 10% from the private sector. Today, it is exactly the reverse with little or no investment in many of the issues that will be central in the next 30–40 years for sustainable development. The role of public finance will remain important.

Andrew J Bennett

Chief Natural Resources Adviser, Department for International Development, UK

I come from a development agency of the British government and one of our prime functions has been to try to eliminate poverty. To do so, we have used a series of international development indicators in education, health, population, and the Rio Summit. As a development agency trying to work through international development targets with governments, our resources are relatively modest. Classically, a development agency has funded projects, finite discreet activities with a beginning, middle, and often, a rather premature end. Whether this is the best way of spending grant money given by tax payers on the strength of the perception that this will promote a better world and sustainable development is questionable.

The other question that often confronts a development agency is that of sustainable development: what is it that we are trying to sustain? Possibly, life on earth and its quality. However, everyone has a different perception of this issue. Financing sustainable development must specify, therefore, what one is trying to sustain. Somewhere between economics and science, individuals choose to live in a particular way. The way in which people and communities live influences the way in which things go on. In a world that is so interested in the process of globalization, the interconnection and the interdependence between societies and the forces that can create opportunities are increasingly apparent. It is quite a dilemma for those in development agencies to know how relatively small amounts of money can be used to influence the present situation. A lot of us are increasingly failing to understand that whether it is a poverty agenda, or recovery from an earthquake, or coping with vulnerability, it is the strength and diversity of civil society that counts. This is one of the cornerstones of sustainable development. How do you handle and create a civil society that allows the negotiation of choices?

One of the other influences on sustainable development is the awful problem of poverty. Poor people are excluded and lack options and opportunities. Many of the things talked about in promoting sustainable development are closely related to the problems of poverty and exclusion. Hence, focusing on how poor people live and are affected would offer a good indicator of whether

: activities are sustainable. Some people argue that because the poor are luded they do not enter into the formula, but experience shows that this ds to instability, the greatest threat to sustainable development. It is eresting to determine the fundamental and underlying causes of stability around the world. This will make it a lot easier to use funding sensibly.

Agenda 21 came up with pretty vast figures for what sustainable develop- nt, and particularly development assistance, was going to cost the velopment community. Since then, development assistance has remained gnant, which creates a reality problem. The idea is that sustainable devel- ment will cost more and, by implication, will cost governments and velopment agencies more, and so is not likely to work because people will ne to believe that sustainability is a luxury only the rich can afford. To ne extent, this defeats the purpose. Hence, it is important not to think that stainability comes at an extra cost. It is about making and encouraging tter use of existing resources. Development agencies can play an important e here. They could remove some of the distortions and problems that poor ople face. Debt relief or debt eradication is an important function served by velopment agencies working with treasuries. The initiatives of highly lebted poor countries are obviously essential and development agencies arly have a role to play.

One interesting area is how to mainstream not just the social and the vironmental aspects but how to get it into the national planning process. of us who went to Rio came away with a view that governments, countries, d organizations were going to develop their own strategies for sustainable velopment. Some interpreted this to be environmental action plans. It is portant to get people thinking about medium- to long-term consequences national processes. In developing national strategies for sustainable devel- ment, and incorporating sustainability in strategic planning processes, it is portant that we learn lessons. One good way of utilizing public finance is to lp learn these lessons, to help exchange views. They should not entail high sts, big bills, but should be enormously valuable, where people should derstand what works and what does not. The other areas include markets d market mechanisms, removing harmful distortions, reducing unproduc- e military expenditure, and improving the policy-making framework.

Another area that seeks a great deal of attention is the problem of corrup- n and malpractice—often the result of weak and unaccountable institutions a civil society that does not know what is going on around it or is not powered to do something about it. There are one or two interesting stud- , particularly in the case of forestry, that indicate how much malpractice d illegal logging costs the forest industry in many countries. In unmasking d controlling corruption and ensuring that these resources are not wasted, the roles of the civil society, the media, and transparency in communications are important. Development assistance has a valuable role not only in helping to get rid of problems and building civil society, helping with debts and so forth, but also in looking at the area of indicators. Is it working? Is it going wrong? So often, failures have come to light so late that we did not know they were happening until they became very expensive. The costs of repairing good things gone wrong is much higher than preventing them from happening. The whole focus of investment in public goods is to understand and develop indicators of what is happening through empirical and participatory techniques. There is still enormous potential to develop new approaches and technologies and ways of identifying how resources might be better used. Research is an important area of development assistance. The GEF (Global Environment Facility) had an important role to play in a white paper recently published in the UK entitled 'Globalization: can we make it work for poor people?' The paper highlights the whole area of public goods, financing, and the importance of increased replenishment of the GEF.

So, while development assistance was seen in Rio as one of the principal sources of finance for promoting sustainable development and *Agenda 21* talked about increasing the flows three fold, that has not happened. All countries want to know if they can attain sustainable development without putting in more money. The answer is that sustainable development can often take place by making better use of available resources. The process of globalization and commercial investment hold enormous power. As controllers of public finance working with governments, we must ensure that resources are used to best effect. Projects are valuable in the sense that they help teach lessons and test ideas. But they are not the end of the relationship between governments and development agencies. They are a way of business, way of learning lessons, and a way of better usage of public expenditure, not a substitute for it. So the future role of development agencies should be more humble, less 'you have problems, we have solutions, we have money' and more of learning lessons and dialogue; how can existing resources be better deployed; to what extent can we supplement them; how can we build on success? The main ingredients of sustainable development are knowledge, technology, effective institutions, and above all a strong civil society—human capital and social capital. Sustainable development is about people and choice.

C Ramachandran

Executive Director, Asian Development Bank, The Philippines

The concept of sustainable development has gained clarity over a period of time and acquired a settled understanding. The landmark event marked by the United Nations Conference on Environment and Development underlined through *Agenda 21* the indivisibility of environmental protection and the development process. The uniting stand in this concept was the conviction that sustainable development required the integration of its economic, environmental, and social components.

When the global trend in sustainable development is reviewed, there are indications that certain things are worse off than they were in 1992. The global environment continues to deteriorate and pollution continues to increase. But, even more in the developing world economic and social poverty is on the increase in absolute terms, and the number of poor in the world — those living on less than one dollar a day — has crossed the one billion mark. Therefore, taken holistically, the financing needs for achieving sustainable development globally involve the developing world on the economic front, the developed world on the ecological front, and changing the patterns of consumption and production. It would also mean changing the ecological climate where our ecological footprint is today 30% larger than what global ecology can take. The cost is huge, though still not unmanageable at probably one or two per cent per annum of the world's GNP (gross domestic product). Several innovative measures have been suggested to meet this cost, starting with James Tobin's proposal in 1972 to tax currency exchange transactions, which could generate trillions of dollars. Further, there are other different forms of global environmental taxes such as one on carbon emissions, on the carbon content of fuels, and the scheme of levying fees on uses of global commons such as the oceans and the atmosphere. These can generate funds but serious impediments are set up by some developed countries in refusing to turn over even a limited portion of taxes to multilateral agencies.

The problem of financing sustainable development for the removal of poverty has been recognized as one of the greatest stumbling blocks not only by developing countries but also from the point of view of many multilateral agencies. Resources in the developing countries are largely consumed to tackle poverty, which, as early as 1969, was described as a critical problem. In the same year, Lester Pierson's report, entitled 'Partners in development', noted that industrialized countries were growing less interested in development assistance while developing countries were becoming impatient and dejected. Although until 1993, ODA (official development assistance) was the main external source of financing development, since then its share has been dwindling and has never achieved the 0.7% rate of GNP agreed upon by developed countries. Instead, it has been hovering around 0.3% of the GNP, which in absolute terms, is around 50 billion dollars a year, and has stagnated there. Fifty billion dollars is not even equal to the amount that developing countries lose by way of agricultural subsidies and other barriers to exports. In fact, an interesting line in the white paper prepared by the Government of the UK on eliminating world poverty states, 'there is no sense, for example, in using development assistance to support countries and then undermining this through trade restrictions and unfair subsidies.' This underlines the need for a coherence in the policies of developing and developed countries in tackling the problem of sustainable development.

The composition of long-term assistance is from the ODA (1990–1999), around 50 billion dollars, from foreign direct investment, up from about 30 billion dollars to 200 billion dollars while other private assistance has increased from about 20 billion to 30 billion dollars. Short-term funds such as portfolio finance have grown manifold. The reduced availability of official resource transfers, including the diminishing role of multilateral agencies such as the World Bank and the ADB (Asian Development Bank), is commonly justified using two arguments. The first is that private investment in an open economy has to be the linchpin of development, and the second that improved quality will compensate for the reduced quantity of assistance. Sometimes, it is further argued that there should be a greater emphasis on mobilizing domestic resources for social and environmental purposes by targeting unproductive expenditure and more eco-sensitive taxation measures. While each of these arguments is valid, in itself they are also flawed if taken at face value without qualification.

Private investment per se does not contribute to environmentally sound and socially just development. In the absence of regulation, a mere emphasis on increasing shareholder value will not automatically promote sustainable development. From the macro-economic perspective, short-term portfolio investments may be even worse, as exemplified by the recent Asian crisis. In fact, one of the challenges that globalization has to face is the growing gap between rich and poor. Over the last three decades, the ratio of the income of the poorest 20% of the world and the top 20% has increased manifold. A comparison of the figures of the per capita income of the lowest 20% in every country instead of their overall per capita income gives a revolutionary twist to the perspective. It is easy to argue that many countries can augment their domestic resources. Despite tremendous potential, the investment–savings gap in many countries cannot be filled exclusively by domestic capital. In many cases the unfettering of structural constraints that inhibit a fuller mobilization of resource and reforms must precede the removal of poverty. These tasks pose intimidating political costs, and even if democratic governments are brave enough to undertake them, they impose large economic costs of adjustment. This point is invariably ignored because there are transitional adjustment costs which must be prioritzed. In the absence of adequate ODA and dwindling multilateral aid, these countries are caught in a vicious cycle, further aggravated by their debt overhang. However, the World Bank and the International Monetary Fund have taken the initiative of writing off the debt burden of highly poor countries. But on the basis of their write-off, the debt sustainability criterion will undergo a revolutionary change if the same criterion were applied to national insolvency laws. National insolvency laws assume that the debt service burden will leave an individual enough money to meet his basic needs or else the creditor does not get his money back. If that criterion were used, the sum being written off will be a huge portion of the two thousand and odd billion dollars of debt borne by poor countries.

The last point concerns the question of quality versus quantity of aid and is a debate raging all over multilateral agencies, the World Bank and the ADB. The ADB was one of the first in 1995 to draft a paper on governance for board approval. However, even when these organizations target poverty removal as the overarching objective, they place new restrictions on assistance based upon performance, a very valuable but limited concept. At the same time, they also embody major attitudinal deficiencies which sometimes retard rather than promote sustainable development. First, the overemphasis on quality ignores or tends to disguise the fact that quality does not obviate the need for quantity but only enhances its effectiveness. Second, it sometimes projects the multilateral agencies as playing a paternal role similar to that between donor and recipient. More importantly, when assessments of performance are used not to fine tune and direct assistance into relevant areas but in order to withhold assistance, they become counter-productive.

Nick Robins

Head, Socially Responsible Investment Team, Henderson Global Investors, UK

Fund management companies manage people's mutual funds and pensions and are concerned with future prosperity. If capitalism is to be made green and sustainable and if it is to contribute to poverty elimination, then there is no better way to start than by looking at capital itself and the role of financial markets in terms of changing practices.

Globalization is clearly not doing enough at present to eliminate poverty or sustain the natural resource base. In many ways, it might be exacerbating these two problems. Clearly, the lack of quick flows of finance for sustainable development are a major stumbling block for emerging markets. The SRI (socially responsible investors) fund managers have two levers with which to tackle these problems. A small lever is through direct investment in the stock exchanges, companies, and emerging markets, and an indirect but large lever can be used to influence the quality of foreign direct investment and the practices that occur along supply chains between the North and South. There are growing ranges of funds offering investors, both institutional and individual, socially responsible or ethical options. These have been playing more positive roles in seeking to positively invest in companies that are leaders in terms of sustainable development and corporate responsibility. An indication of this is the recent launch of the Dow Jones Sustainability Index, so now environment managers in Europe and North America are concerned about their ratings on this index. In the US, about 13% of funds have been called green to some extent on this socially responsible basis. But the question is, how can this socially responsible investment help in closing the development divide in our world and in investing positively in emerging markets?

Henderson Global Investors has been practising socially responsible investments since 1977 and, since starting in a very small way, now has one billion pounds under its management on this basis, out of a total fund of a hundred billion. The approach is to look for solutions and to invest in industries of the future that can provide the solutions to the problems of today. Some of these industries include the renewable energy companies, the recycling waste management companies, companies engaged in mobility management healthcare, education, and so on. Companies in existing sectors, banks, manufacturing, retail and so on, that are actually making efforts to improve their performance are being rewarded. But how can critical issues be addressed and integrated into the research process?

Another concern is with driving the carbon transition. In the UK, the government's climate change programme has said that emissions of carbon dioxide have to be reduced by about 95% over this century. How can investors drive that transition, particularly by investing in renewables? We are also looking at ways in which human rights can be promoted and defended, probably most directly through supply chains, through scrutinizing the practices of retailers, clothing retailers, and food retailers. A recent environmental debate in the UK and Europe has been over new technologies, which have not been demonstrated to be safe—genetically modified products cannot be bought in UK's retail shops because of stiff resistance. Similar risks attend telecoms in view of the long-term health effects of mobile phones.

Finally, the issue that underlies all of these is how to encourage more corporate accountability and transparency. Unless companies report, there will be no information on which to base investments. There are a number of reasons why this SRI movement will gain pace and become more mainstream in the coming years, the first being analytical. It is now being shown that investing with a view to sustainability does not lead to lower returns and many of the top performing funds in the UK and elsewhere have been ones which have taken the right approach.

There have been regulatory shifts in the UK. The recent Pensions Act, which governs the management of pensions, requires pension managers to state their social, ethical, and environmental policies. This is leading to a huge flurry of activity among the pension fund managers. Companies now listed on the London Stock Exchange have to present a report each year on how they are managing risks—not just business risks—but risks leading to the environment, to reputation, business probity and ethics. There is a growing demand from investors, both individual and institutional, for an SRI approach because they see good returns, and because it meets ethical requirement. The UK government has also considered having companies develop a greenhouse gas indicator. Interestingly, now there is a public expectation and drive where previously the financial community was not a target for NGO (non-governmental organization) activism. It has been the big companies themselves that have faced the boycotts and the campaigns and so on. But now the financial markets are being seen as a major lever for influence, and NGOs are now targeting financial companies to use their muscle to change performance. The BP (British Petroleum) annual general meeting in April 2001 will be a major forum for investors' activism and about commitment to climate change.

Corporate governance has traditionally been about ensuring that the companies are well and transparently run, that the directors do not abuse their positions and run off with the company's money. Now, that is extended to include key corporate responsibility issues such as those of human rights, labour conditions, environmental management, and community relations. These will become part of the regular dialogue that investors will have in companies across mainstream funds, and, if necessary, an ultimate sanction could lead to the investors voting against the company at their annual general meetings. One of the barriers in the past to SRI investing in emerging markets has been a lack of objective information comparing the performance of companies. This would mean forging research partnerships with agencies in emerging markets in India, with agencies such as TERI, the Confederation of Indian Industry, and the Centre for Science and Environment, all working in this area.

Another major bottleneck has been the disclosure by companies of their environmental and social performance. Improving that will improve the flow of SRI performance. Finally, it will be interesting to explore the demand by domestic investors in SRI, in mutual funds and so on, to see whether consumers in India who do invest in companies are also starting to become interested in looking closely at the funds they are investing in Indian companies.

Summary of the questions-and-answers session

Questions were raised relating to strategic partnerships, broad-based policies with respect to natural resources and micro credit for poverty alleviation.

Foreign direct investment has grown four or five times over the last 20 years but has still not reached areas that will have a direct impact on sustainable development or the removal of poverty. It is largely directed to big projects with large and immediate returns on capital. The fundamental responsibility would, therefore, have to devolve on domestic resources. Multilateral agencies would be better off playing the role of financial intermediaries by increasing their capital strength, going into the market, and raising funds which could then be lent for development in the environment, water supply, sanitation, education, and health.

The potential for such partnerships is greatest at the strategic level where the rules of the game for investment are being worked out. The World Business Council for Sustainable Development is formulating rules for effective private investment in the mining sector. However, public institutions, regulatory frameworks, and accountability would have to exist for such a model to be successful.

With respect to sub-Saharan Africa, a crying need was felt for broad-based policies relating to natural resources, particularly land and water management. The World Bank and other agencies were attempting to focus more on community-driven development.

It was also observed that microcredit was not available in areas such as environmental or energy technology. The microcredit system could help in sustainable development and in the alleviation of poverty.

Plenary session 6

Sustainable agriculture, food security, and knowledge for rural development

Chairperson: Lawrence S Bacow
Panellists: Horacio E Navarrette, Vibha Dhawan, Florence Wambugu

Chairperson's remarks

Lawrence S Bacow, Chancellor, Massachusetts Institute of Technology, Massachusetts, USA

The world's population continues to grow: the World Bank estimates that by 2030, there will be 3.7 billion additional mouths to feed worldwide. This is occurring at a time when the absolute amount of land available for agricultural production is declining in many regions of the world. We are, therefore, seeking to feed a growing population with a smaller amount of agricultural land. Second, we are continuing a trend that began in the industrial revolution—the trend of urbanization as people continue to move from rural to urban areas. This is a phenomenon well understood in the developed world, but increasingly true in the developing world as well, as people seek better economic opportunities by moving to the cities. This is having a profound impact on world population and on popular habitats.

In 1990, the bulk of the world's population lived in rural areas; by 2030, the bulk will be located in cities. A way of studying this is to examine the growth of the world's mega-cities to find cities with populations greater than 3 million. In 1970, there were only 35 cities in the world with a population of 3 million or more. Today there are 85, and by 2025, there will be 160 such cities. There are a number of consequences of the growing urbanization of the world's population and the concentration, especially of the poor, in cities. The cities themselves provide enormous environmental management challenges as we seek to provide shelter, food and water, and sanitary conditions for increasing numbers of people living in close proximity to each other.

Mobility is another major issue as we concentrate the world's population in a small number of places. Although the tools for dealing with these issues may be available to us, our ability to actually govern the growing population is quite limited. The failure of governance is a matter of concern to all.

Urbanization has an enormous impact over food production and the availability of water worldwide. As we concentrate on people in cities by moving people from rural to urban areas, this has two major consequences for agriculture. First, productivity in the agricultural sector must increase if we are to feed the world's population. Second, people will live farther from where the food is produced, and that will raise issues of food security and how we distribute food to a growing world population. We have many warehouses, but empty stomachs and consequently distribution of food will become an increasingly important issue. There are limited opportunities for us to improve the productivity of the agricultural sector and if new technologies are not explored, many of the extant ones can have adverse consequences for the sustainability of production.

One way by which we can increase food productivity is to increasingly utilize irrigation for the production of food. Long-term irrigation itself jeopardizes the sustainability of the world's water supply by drawing off surface water, and also results over time in a falling water table and salinized soil, increasingly becoming problems in many parts of the world.

Another way in which we can increase crop yields is to rely much more heavily on fertilizers and pesticides to improve crop yields, which again adversely affect the environment in a variety of ways. We are today saturating the world with fertilizers. The consequences of this are evident in terms of coastal eutrophication and loss of species diversity in certain areas.

The third way to increase the productivity of the agricultural sector is by modifying the crops themselves, using the techniques of genetic modification which also poses interesting challenges for both the developed and the developing worlds.

As we redistribute the production of food throughout the world, there are some opportunities by way of globalization of trade in food. There is also the prospect that some unsustainable agricultural practices will yield to more efficient location of production in parts of the world that are better suited to producing the food. Currently, we subsidize not only agricultural products but also water and energy, with dramatic consequences. This leads to a profligate use of water in growing crops such as rice in the arid regions of the world such as southern California, USA. Concentrating on food in certain regions of the world will mean that poor nations of the world may find themselves in a position where they are forced to trade for food, and it is far from clear whether or not these nations will have the resources necessary to purchase food on the world market if they can no longer grow it at home, and food transport itself raises difficult issues in terms of food security. The challenge before us is to provide a more productive agricultural sector to feed the world in a sustainable manner.

Horacio E Navarrette

Smaller Holder Agriculture Team Leader, Global Product Manager,
Monsanto Company, Missouri, USA

Monsanto's vision since the early 1990s has been abundant food and a healthy environment. And one of the objectives of this vision has been to help increase food production in developing countries. Projects in several developing countries have addressed this issue for the last 8–10 years, and work with small-holders has enhanced the company's vision, supporting sustainable development in the developing world on three pillars—social, economic, and environmental benefits to all stakeholders. The main problem is in the tropical bands of Latin America, Africa, and Asia, where the most help is needed to support rural development. Monsanto has been in the news for the last few years in the field of agricultural biotechnology. The new Monsanto pledge includes the following elements: to engage in dialogue with all interested parties, transparency in making scientific data on product safety and on benefits publicly available; we are committed to respecting the religious and ethical concerns of people throughout the world. We are committed to bringing the knowledge and advantages of four forms of agriculture to resource-poor farmers in developing countries to help improve food security and also protect the environment; and working for and delivering benefits to farmers, commercially as well as environmentally. This is an example of corporate social responsibility.

As a private sector company, we have a commercial organization that is active in over 100 countries and reaches over 25 million more small-holders in a commercial way with a traditional model that is product-oriented, having people in the field and providing support to these farmers. But this is not even 5% of the cases; 95% of small-holder farmers are completely underserved and require a new model, and this is what we do in our small-holder team. A traditional product-oriented top-down approach will not be sustainable. If we are to serve the vast majority of small-holders, we need to take a fresh and holistic approach, and need to work with partners and others. We also have another initiative, non-commercial technology cooperation, which is an effort to work with public institutions, non-profit groups, and local industries around the world to share our technology non-commercially—e.g. coding of the rice genome and some Vitamin A projects (including the one on mustard improvement with TERI). We are also one of the four major sponsors of the Microcredit Summit Campaign.

I firmly believe that micro-credit is an effective tool to alleviate poverty in both rural and urban areas and will be an integral part of any rural development effort in the future. We also have a philanthropic arm, a foundation of

501 (c)(3) (as called in the US), where we invest millions of dollars in supporting institutions, including those in India, philanthropically. Here we have several projects that support the capacity building of several NGOs (non-governmental organizations). As a corporate, we obviously have a profit motive and are responsible to our share-owners, but one of our main objectives has been social responsibility for helping people and the planet. It is a challenge to get everyone in a commercial organization to follow these principles. This is important for all corporations to follow.

We see small-holders as those who have 5 ha or less, but it varies from country to country. In India, a landowner with 5 ha is a large holder but in other countries such as Mexico, it is still considered small. In Poland, this figure may be 25 ha, in Brazil up to 50 ha, but this segment of population is normally under-served. At the one end, there are more technified large small-holders who grow food crops to sell to the market; at the other extreme, there are subsistence farmers (normally 1 ha, a couple of acres, or less) who produce just enough to feed themselves and their animals. And there is a big group in between that is mixed, producing for other's consumption and for market sales. Our team is working with all these segments, and we are trying to develop environmentally sustainable technologies that will allow the farmers to produce more. It is going to be a big challenge in the future to be more efficient in agricultural production while protecting the environment. Some of the conclusions we have come to so far, working with the small-holders around the world, are that we basically need to establish a criteria matrix, identify the groups to work with, have a dedicated presence at the village level, do a baseline survey of needs, something that most corporates have not done in the past; and in all these we need to take a bottom-up approach. We normally commission an NGO or a market research firm to do a baseline survey of needs. In a holistic approach to needs, there are social, economic, and environmental needs, not just economic ones. After establishing the needs of the communities, we take the initiative to create a consortium of allies and partners to help us provide what we would like to call a 'total solution' or a 'one-stop shop' system of goods and services, which would allow a given farming or a small-holder or rural family to prosper. What we are doing today has to be supported by environmentally friendly technologies. We must also have quality training and technology-transfer programmes with village leaders. We have found it useful to have the farmer associate a name with the system, as for instance in Mexico the programme is called Campo UNIDO, United Fields, and the sowing of new hopes is the tag line. In India, we have a programme in West Bengal called Chaitanya. We also must do impact assessment studies to maintain sustainability and retention in the programme. A holistic analysis has shown that in African, Asian, and Latin American countries where we operate, there are four major income-generating value chains. We have the crop value chain, which goes all the way from what the needs of the farmers are to the access to technology, training, and production, where the surplus production goes to the market through traders or processors.

The issue of infrastructure is extremely important, as we tend to neglect post-harvest storage and distribution. Some of the production goes back to the farmer for consumption and some to animals. In most cases farmers have animals – in India it may be buffaloes; in Mexico chickens; in Africa cattle – which are another source of income generation for farmers. Another important chain is micro-enterprise, and that is where micro-credit and capacity building, NGOs, and micro-financing institutions play an important role. In most cases, we deal with the women of the families, providing capacity building and sources of funding for their self-employment in areas such as paddy trading, handicrafts, or sewing dresses. This provides another source of income to the families.

There is another new addition to the value chain, which is family remittance. In Mexico, over 8 billion dollars has been remitted every year back to Mexico from family members in the United States, 60% of which goes to rural families. We are working with an NGO to motivate farming families to invest some of these funds into productive income-generating activities. Today 80% of the funds are consumed. In Asia, some of the remittances may go from state to state. Mexico, through improved technology, has been able to increase production (in many cases in corn), even tripling yields, creating surpluses by which the farmers have been able to create savings and buy animals. Once the farmer progresses and generates income, he grows more committed to a market economy and begins the cycle towards productivity.

At Monsanto, we are committed to sharing and adding technologies through a new plan of action, being good corporate citizens; our small-holder efforts are a participatory grass-roots bottom-up approach. We are taking a step back and looking at the whole big picture and not just concentrating on the areas that we know the most about. Obviously, we cannot do this without the help of others. We support sustainable development and are developing sustainable models of rural development through pilot projects with partners around the world. Let us join hands in this great crusade which leaves nobody behind.

Vibha Dhawan

Director, Bioresources and Biotechnology Division, TERI, India

Asia is a continent with 60% of the world's population, where nearly half of the world's 1.3 billion poor reside and where the requirement for food and fibre is the maximum. While debating issues of calorie intake and food security, the fact that a large section of our population is still malnourished and suffers from deficiencies of iron, vitamin A, etc. is often ignored. Asian farmers are poor, not well educated, have very small landholdings less than a hectare, have no credit facility available to them, and are not directly involved in defining agricultural policies for the country. Moreover, the agricultural infrastructure is poor and farmers have poor market accessibility.

A hard task lies ahead. In the next 50 years, food production must double from the same land resources, and on account of globalization we need to ensure cost-competitiveness. It should not be cheaper to import food rather than produce it. Dr Wambugu highlighted that in small farms, because of low levels of productivity and high manpower requirements, the cost of production is much higher than what can be achieved in mechanically managed large farms. The positive aspect is that Asia has a lot of trained manpower and infrastructure, and both the scientific and the farming communities can assimilate and adopt new technologies at a fast pace. There is no single solution to this problem—an integrated approach is needed. Conventional breeding practices cannot be neglected. The results of the Green Revolution have been good and we are still reaping its benefits. New technologies such as micro-propagation have been developed and demonstrated but these must be taken to farmers who really need them. There are many technologies such as crop management, IPM (integrated pest management), bio-pesticides, and bio-fertilizers, which may be considered traditional biotechnology. These are well developed, and the only gap lies in taking them to the farmer.

TERI has taken a few initiatives because it is not just food security which is important, but development as a whole. In rural India, the locals still depend on biomass for fuel, certainly not the most efficient way of utilizing resources. It also leads to high levels of indoor pollution. Cleaner options such as biogas plants set up during the last decade have been both success stories as well as failures. The failures are largely because of unavailability of dung in adequate quantities. The second major problem was that in north India, at low winter temperatures, the production of biogas was also low. This proved to be a major bottleneck in the commercialization of biogas plants. TERI is working towards developing a microbial consortia, which not only works at low temperatures but also allows used agricultural waste to be used as a substitute for cow-dung in biogas production. This is an added advantage because agricultural wastes are otherwise burnt in the field, worsening the micro-environment. Similarly, the lack of facilities makes solid waste management a major problem in rural, and even urban areas. It is important to have small-scale solutions to treat municipal solid waste and generate energy from it. Some wastes such as vegetable waste can be fed to the biogas plant to generate energy; in addition, one gets organic manure, which can be used for organic cultivation.

We have developed the Oilzapper technology, which is a consortium of oil-eating bacteria. This technique has been commercialized and is now being used by major oil companies in the country. We have also set up a Centre for Mycorrhizal Research. Mycorrhiza is a form of symbiotic association between fungi and the roots of higher plants, which helps to mobilize the unavailable form of nutrients present in the soil for the plant. Therefore, it is important for marginal farmers who cannot afford chemical fertilizers to inoculate their fields with mycorrhiza. Inoculated plants have shown better survival in difficult sites, and the biomass production was also higher. Moreover, mycorrhiza-inoculated plants, through their meshy roots, help in reclaiming fly ash ponds, a serious environmental problem.

A tissue culture laboratory has been set up with financial support from the DBT (Department of Biotechnology), Government of India, where 2 million plants are produced annually. When this project was initiated, a large number of tissue culture units were being set up in the country. Most of them were export-oriented and trying to use the cheap manpower available in the country. We did not visualize the possible benefits to our farmers in producing better plants, improving our yields, and possibly exporting the end-product. At that time, the DBT took the lead and established pilot-scale facilities, one at TERI and the other at the NCL (National Chemical Laboratory), Pune, to take up tissue culture work on forestry species because our biomass problems are far greater than those of other countries. So far 7.5 million plants have been produced, which have been planted in fields. Apart from forestry species, sugar cane, potato, banana, and strawberry are being worked upon.

One has to work with the rural population and sometimes adopt different management practices. For example, if there are no irrigation facilities, planting times may have to be changed. All the stakeholders have to be involved to get better results. One such example is that of joint forest management. Around Indian villages there are panchayat or common lands to be used by all the stakeholders or villagers. But because of increasing population pressures, these lands have been over-exploited and turned into wastelands. TERI's objective is to take the stakeholders into confidence, to understand and meet their requirements, and to develop a long-term strategy. Simply providing protection and denying access to the area will never work.

Apart from what has been developed at TERI, we have also tried to provide farmers access to technologies developed elsewhere. Within a radius of 20 km around New Delhi, there are villages where farmers still do not know about new varieties and current management practices. Because of his own financial situation and poor micro-credit facilities available to him, the farmer depends on the trader for credit. He can never choose the pesticide to spray or the seed variety to be used. To begin with, we have selected only three major crops: wheat, paddy, and sugar cane, and are working with there in five villages. We intend to increase our reach to more and more farmers and use those who have used this technology as trainers to spread the message.

In plant molecular biology, one of the crops we had started working with in 1985 was mustard or the *Brassica* species. We are working on cutting-edge technologies such as DNA fingerprinting as well as developing transgenics. DNA fingerprinting is being used largely to establish biodiversity at the molecular level and to decide on what kind of diversity should be conserved. One of the major problems regarding transgenics is that many people are ignorant about it. We are discussing among ourselves whether this technology should go to the farmer. For this, about a year ago, we initiated the stakeholders' dialogue, where we involved policy-makers, researchers, representatives from industry, and farmers, to understand their needs and concerns. We have set up a web site on policy discussion through which we answer the questions posed by various stakeholders. From 1995 to 1999, the area under transgenic plants has increased, but the disturbing fact is that this increase has been largely in developed countries. Their crops such as vegetables, and quite a few fruits, cereals, and legumes in respect of which transgenics would be useful and change the food security scenario in the developing world. The major setback for this technology has been the lack of public acceptance. Perhaps people resist it because the benefit accrues to the farmer and not to the consumer. Therefore, it will be useful to find ways to enhance the nutritive value of food so that the consumer is directly benefitted. The consumer must get something that he cannot get otherwise by traditional methods or something that is far superior to what is available in the market today.

Opponents of biotechnology have posed a number of questions relating to potential environmental risks, biosafety, food safety, etc., which scientists are obliged to respond to. These questions must be asked by the developer of technology and be answered before commercial release. Substantial evidence from North America indicates that so far there have been no ill effects on people who consume transgenic food in large quantities. Although Europeans also have not proven anything against the GMOs (genetically modified organisms), they have invoked the precautionary principle that there is insufficient scientific evidence to conclude that there is no risk. But in developing countries, if this precautionary principle had been applied decades ago to innovations such as polio vaccines and antibiotics, regulators might have prevented the occasional fatal side effects, but at the expense of millions of lives that would have been lost due to infectious diseases. Similarly, we have to see if there can be any comparison between the risk to the developed world, which enjoys surplus and relatively inexpensive food, and risk to the poor in developing countries where people cannot afford two meals a day and where many more are dying of malnutrition.

What we are looking for is a global society, which seeks equitable solutions to different needs of people and nations. All nations must strive to achieve food security, that is, food for all at an affordable price. The United States Agency for International Development is supporting the development of transgenic golden rice and mustard oil enriched with b-carotene. There will hopefully be a commercial release of oil and cereals enriched with Vitamin A in the next 3–4 years. What one is seeking from international institutions for the developing world is access to technology, training for scientists in technology, and biosafety, food safety, and more lenience in Intellectual Property Rights issues. Biotechnology, like any other technology, has its strengths and weaknesses and therefore needs to be applied responsibly. Rich traditional knowledge, breeding, and other methodologies should be woven together with biotechnology; only then will we be able to deliver more productive crops for resource-deficient farmers.

Florence Wambugu

Director, International Service for the Acquisition of Agri-biotech Applications, AfriCenter, Kenya

The poor in Africa are not different from the poor in Asia or anywhere else. They do not like being poor, they feel left out, and they would like to participate in development. As we move towards globalization, it is important that we do not leave the poor behind because their fortunes are integral to current developments. Food insecurity and the need for a thrust towards sustainability in Africa are issues not very different from those in Asia, which also faces the serious problem of hunger and poverty.

Africa's population is increasing at the rate of 3.5% as compared with a 2.5% increase in food production. Therefore, even as we increase food production, there is a need to bring down the population. The declining availability of land per family has mounted pressure on the ecosystem and on natural resources. There is need to increase the production of most food items. The role of technology in augmenting food production cannot be ignored because we do know that technologically-advanced countries such as Japan are able to feed themselves by importing food. Countries such as Egypt have only the river Nile, which touches East Africa and passes through

Ethiopia, and yet they do not suffer from hunger and poverty. Trends of food production in Africa versus the rest of the world clearly show that Africa continues to be a zone of hunger and poverty. The yield of maize – the major African crop – is 1.7 tonnes/ha whereas the global average is 4.11 tonnes/ha. In Europe and in America where the use of land is optimum, the yield is actually 6 tonnes/ha. The small yield in Africa is largely due to pests, diseases, and some other problems. In Africa, the production of sweet potato, a crop providing subsistence and food security, is 4.8 tonnes/ha compared with the world average of 14.7 tonnes/ha, with China producing 18 tonnes/ha. Banana is another crop that provides food security for the poor, with Costa Rica being the major producer. The average productivity of banana is 6 tonnes/ha compared with a world average of 10.11 tonnes/ha, and the potential is 60 tonnes/ha. Similar trends in productivity are seen in other crops also. All of sub-Saharan Africa suffers from hunger and poverty, posing a major challenge to international as well as the national agriculture. Hunger is not just a concept – we are not going to end it by merely talking about it. We will have to do something to achieve practical results. In his recent appeal, the President of Kenya appealed to donor countries to come to the rescue of our starving nation. The current situation is really alarming; something needs to be done about it immediately.

In addition to addressing the issue of population we must also try to increase the production per unit of land through the sustainable use of natural resources, using better quality seeds, and adopting new technologies including GMOs. I believe that these technologies have the potential to increase production in Africa. Another challenge before us is improving biodiversity utilization and reducing external inputs. This is an area where Africa has shortage of capital, and many small-scale farmers do not have the money to buy fertilizers and pesticides. We need to develop a system that reduces the inputs and tries to integrate conventional agriculture with biotechnology that is user friendly for African farmers. The GM (genetic modification) technology has a major role to play in this, and is user-friendly for many poor African farmers because the technology is packaged in the seed and not in chemicals. Several areas in Africa practise organic farming and do not use many chemicals. While production in Europe and America is based on chemicals, Africa has not been benefitted by chemical technology. Even illiterate people can benefit from seed-based technologies. Of course, this can only be possible after ascertaining the environmental and food safety of the GM product through a regulatory system. The world is now growing GMOs on 100 million acres of land in Canada, China, Europe, South Africa, and USA.

The ISAAA (International Service for the Acquisition of Agri-biotech Applications) has adopted a multidisciplinary approach to promote sustainable development in Africa. This calls for a public–private sector interface and for scientists, social scientists, policy-makers, farmers, and NGOs (non-governmental organizations) to work together. This is because scientists alone will not be able to take the technology to farmers. Our second strategy is a collaborating network of partners, donors, local and international communities with Asia as the facilitator and involving partners from Germany, Kenya, and South Africa. We also need a complete back-up of economic studies because the small-scale system is fragile, wherein one cannot apply a technological push so easily. The bottomline approach that has worked best in the past is consulting the farmers and finding out what they really need instead of imposing technologies on them. Farmers are intelligent and have a lot of indigenous knowledge. It is important to discuss issues with them as stakeholders, doing field surveys with them, and establishing their needs. There are examples of tissue culture technology for bananas, as also for cassava, sweet potatoes, or any crops that have an impact through international Consultative Groups on International Agricultural Research centres. These products are distributed and in each case active participation from the private sectors is needed, which is currently missing. It is not enough for big companies to be pioneers in research; the private sector is needed to ensure that the technology is tailor-made to produce an impact in rural areas. Initially, it was difficult to make big private companies realize that they could make profits from such ventures, most of whom were doing business only in flowers for export to the Netherlands. They argue that there is no money in the cultivation of banana, cassava, or pyrethrum. After convincing them that local crops could also be a lucrative business proposition, many private companies, such as Genetic Technologies Limited, have taken to practising tissue culture to cater to local needs.

The next issue is how to take this technology to the poor farmers—to work with the farmers, for the farmers. This is a totally different concept which sometimes international centres can use with farmers. There can be a demonstration once a year which farmers attend to see the products. Farm trials should be conducted to win their confidence. It is time for experts to go to the farmers. In South Africa, tissue-culture technology has been successfully transferred to the farmers; 95% of farmers in South Africa now use this technology. Although farming in South Africa is different from that in Kenya, the concept remains the same; farmers must have a business and the know-how created to manage it themselves. Farmers believe what they see and not what one tells them. Therefore, through a set of experiments, we tried to compare for the farmers a tissue-cultured plant, which was healthy and vigorous, with a traditional one. In one set of experiments, we asked the farmers to plant normal and tissue-cultured plants without guiding them on what to do, while in the next set we encouraged proper management such as adding manure and removing suckers. Without proper management, the tissue-cultured plants yielded 30 kg, whereas conventional plants (suckers) yielded only 10 kg. In contrast, by adopting proper management, tissue-cultured plants yielded 60 kg and conventional plants only 20 kg. So the farmer can clearly see that he can earn a lot more through proper management.

This project has been used all over Kenya and has also moved to Tanzania now. Tissue culture is not new, but having farmers use it and benefit from it is. There are cases of farmers who have been totally moved out of the poverty zone. If a farmer sows 100 plants, within months he can sell enough bunches to make 500–600 dollars. With this money, he can grow more plants and make more money.

The farmers themselves are now forming distribution systems. Major NGOs have offered to provide extension services. A major bottleneck in expanding this programme is microcredit because the cost of raising tissue-cultured plants is double that of suckers. To undertake such a project, higher investment is unavoidable. Therefore, the ISAAA gave loans to give more microcredit. A total of 15 000 dollars has been loaned to 400 families. The impact of this microcredit is that these farmers are now earning about 65 dollars a month compared with 40 dollars a month earlier. The repayment of the credit is earning up to 95% interest, which is outstanding for our country because these people do not pay loans and many people still do not extend microcredit facilities because they do not believe that agriculture and poor farmers can pay back. I spent a lot of time visiting several organizations but to no avail, as they feel that it is too risky. We are now documenting our experiences to help us attract funding. Our example proves beyond doubt that the poor can – and should – participate in global development.

Summary of the questions-and-answers session

The session began with a discussion on post-harvest losses. A participant said that 30%–40% of agricultural production was lost through post-harvest losses. In response, Mr Horacio E Navarrete said that one would have to take a holistic approach. The participant also said that in Africa, despite favourable weather, lack of proper irrigation facility made food production rely entirely on nature. He suggested small-scale irrigation be the focus of production. Dr Florence Wambugu said that the bottomline was to use technology to harness natural resources and use them in a sustainable manner. Dr Vibha Dhawan spoke about watershed management to counter irrigation problems and develop infrastructure for post-harvest losses.

Dr Dhawan said that considering the burgeoning population, food production needed to be increased and there was no doubt that population growth needed to be stymied. She spoke in response to a statement by a participant that unless we reduced or nullified population growth, we might be groping in the dark. Dr Dhawan also said that since GM technology was expensive, one would be approaching transgenics but continuing with conventional breeding systems as well. She said that it would not be prudent to abandon previously developed technologies.

A participant observed that if one was looking at sustainable agriculture and food security, there will have to be increased government investments in research so that the technologies generated are commensurate with the world's needs. Dr Dhawan said that there were no two opinions about increasing funds for agricultural research and related areas. They assumed great significance in a country like India where 70% of the population depended on agriculture for a livelihood. However, she felt that apart from the government, the corporate sector will have to play a far greater role than it was doing currently. Scientists should work with the corporates, who in turn needed to interact with the farmers.

Mr Navarrete said that apart from developing technologies, scientists needed to work with the public sector and local bodies. The private sector had the global expertise while local expertise was in the hands of local institutions. Thus, there was a definite need to work together.

The discussion then veered to GMOs. Dr Dhawan said that in India, there was a good regulatory framework for the release of GMOs. She said that much had been said about the risks involved in GM crops. Normally, the risk was greater in the pesticides that are sprayed on the leaves of normal plants than in GM crops. Dr Wambugu said that European countries may not want to in use GM technology because of their already surplus food production. However, African countries that talk of doubling their food production should surely assess its potential.

Plenary session 7

Energy for the masses

Chairperson: Umberto Colombo
Panellists: Hoesung Lee, Vikram Mehta, Nebojsa Nakicenovic, Antonio V del Rosario

Poverty: the global challenge for governments, industry, scientists, and civil society 105–116

Chairperson's remarks by

Umberto Colombo, Former Minister of Universities, Science, and Technology, Rome, Italy

One of the key aspects that makes the ongoing process of socio-economic development unsustainable is the intolerable yet ever-growing gap between different countries and regions, and between the different population groups within each one of them. This is a pattern present in the 'rich' North of the planet, but one that is even more acute in the 'poor' South. Lack of energy, in the quantity and of the quality demanded by society, is an intractable and perturbing component of such a gap.

Over two billion of the six billion human beings populating planet Earth live at subsistence level. For these people, access to the energy market and especially to electricity—the most versatile form of energy, indispensable for a whole series of uses of fundamental and growing importance to society—is impossible. Without electricity, a modern quality of life remains out of reach—in healthcare, in education, in the application of individual skills and aptitudes.

In the poorest countries and in the poorest regions of all developing countries, the most common and diffused form of energy is still biomass – agricultural or animal waste and wood-fuel. This biomass is often collected and used in a highly inefficient manner. Denying the soil nutrients or, leading as it does to deforestation, unchecked reliance on biomass can be considered, for all practical purposes, the use of a non-renewable resource.

In industrialized countries, over the last century, a complex, centralized energy system based on massive plants for the conversion of primary sources (refineries, thermo-electric and hydro-electric generation units, etc.) has been developed. The system also demands heavy transport and distribution infrastructures, which have to be built over decades at an enormous expense, draining scarce capital resources. The inherent rigidity of such systems has led to a trend that now seeks greater flexibility by reducing the size and complexity of new plants to free up supply, to rely on market mechanisms and competition to free up demand, to alert consumers – both large and small – to assess the true cost to society of energy provision through pricing policies.

Furthermore, the precariousness of the present fossil-fuel-based world energy system can no longer be denied. Besides the finite nature of these fuels, the greenhouse gas emissions that their use entails is a menace to the stability of global climate, not just the global economy. New renewable energy sources incorporating the most modern technologies are badly needed, sources capable of replacing fossil fuels in small-scale urban and isolated rural areas in the developing world. This transition must take place as soon as possible.

By their very nature, renewable energy sources can be diffused and widely distributed geographically. In principle, these sources require a different, leaner infrastructure, one that is able to cope with the need to continuously adapt the uneven pattern of energy supply to actual trends in demand.

Larger energy plants are still going to be necessary to provide, for example, base electricity load wherever large transmission grids are already in place. Larger units are particularly suited to speedy introduction of state-of-the-art technologies in petroleum refining, clean coal technologies, in particular in combined-cycle and cogeneration plants.

There exists an opportunity for developing countries to avoid following the path established in the past by the industrialized countries. They can build up an energy system that is more tuned to their present and their future needs. Leap-frogging current capital-intensive practices in the industrialized world, they can anticipate the imminent evolution in energy patterns in advanced countries, which is going to take them to a far more efficient, flexible, and decentralized energy system.

It should be noted that a parallel evolution towards decentralization is also occurring in information technologies and telecommunications as a result of the convergence of computing, mobile telephony, the Internet, television, and the media. With the power to permit comparable standards in quality of life in the cities and in the countryside, and to generate new, highly rewarded jobs in a variety of local conditions, such developments may help to reduce the pressure towards excessive, chaotic, urbanization which seems an inescapable feature of development today. Energy systems of the future must be consistent with this type of evolution—indeed, they must target it.

More than in most developing countries, the pattern of population distribution in India is based on the existence of innumerable village communities. Many of these are active and efficient in the introduction and diffusion of sustainable energy systems based for example on biomass (to start with biogas), solar-photovoltaic, and mini-hydro units. A different pattern of decentralized development is shown in the Chinese TVEs (township and village enterprises). These were developed with the aim of integrating industry and agriculture and are generally based on communities of a larger size. Even though the energy efficiency of TVEs has hitherto not been very satisfactory, there is scope for improvements leading to greater sustainability. The two models, the Indian village communities and the Chinese TVEs, can both learn from each other. Taking into consideration the socio-economic and cultural differences, there are lessons here for the rest of the world.

It should not be forgotten that the world must address without any further delay the problem of global warming. This is one of the most morally compelling issues of our time. Reducing greenhouse gas emissions has to become a top priority everywhere. The growing potential of renewable energy sources is there to be harnessed. This is where research and development should be concentrated. We can use fossil fuels in the meantime, but with ever greater parsimony, while taking increasing advantage of new technologies to keep improving the energy efficiency of our societies and exploring less energy-intensive scenarios for development and economic growth.

There is a need to reverse the trend towards today's widening gap between the rich and the poor in the world. This is not only, nor principally, an income gap, however. The gap is even more in knowledge. We cannot design, in a technocratic fashion, an ever more decentralized energy system based on new sources and technologies without understanding that in order to make it become reality, a supreme effort must be made to bridge the knowledge gap; to enable men and women of all ages and regions to appreciate that their activity and behaviour does matter; to enable them to change both for the better; and to operate ever more sophisticated systems in a knowledge-rich society. Energy for the masses can empower them, free them from poverty and deprivation and, above all, from ignorance and denied opportunity.

Hoesung Lee

President, Council on Energy and Environment, Seoul, Korea

Several typical parameters need to be analysed regarding energy for the masses. In Korea, for example, twenty years ago, there was no LNG (liquefied natural gas) and also very little nuclear power. The majority of the energy came from petroleum, which was entirely imported. About 20 years ago there was the second oil shock. At that time, oil prices were 30 dollars per barrel. One was not sure when the next barrel of oil would come to the country and at what price. It was during this difficult time that planners in Korea started looking at different options, and became specifically interested in managing prices. They discovered that Japan was already importing LNG and was also investing heavily in nuclear power.

Korea went ahead with the natural gas and nuclear options, and then expected to continue the expansion of LNG. The current share of LNG is 8.2%, and that of nuclear is 10.7%. Over the next 20 years, the share of LNG is expected to rise to about 14% and nuclear to 17%.

Going back to the 1980 decision, the policy-planners faced two choices. One choice was to take no action and just follow the business-as-usual trend: keep on importing petroleum and rely on domestic refining. It was thought that adopting the status quo path would be very risky and extremely expensive for the country. The alternative was to import LNG and expand the nuclear capacity. The question whether we could afford these two expensive resources was very critical at that juncture. We chose to go ahead with them, believing that even if the costs were too high, they were acceptable to the economy. The reason we chose that course was that we expected the country's economy to grow at 8% for some time and if that happened, the per capita income would increase and eventually the energy burden per person would decline. Fortunately, in the 1980s and 1990s (due to a conducive work environment) Korea's economy grew at an average rate of 8%, and we were able to double the per capita income in 10 years. In fact, the energy burden in the 1980s was 6% of the gross national product and it reduced by 3% in the latter part of 1990s. Therefore, the decision of the planners turned out to be a very good one.

This experience taught us that providing energy to the masses required sustained economic growth which must be translated into sustainable development. It was established that the crux of sustainable development was energy, which is entirely true if one looks at sustainability in the context of energy: that is, how to reduce pollution intensity. If one looks at the trend in pollution intensity, it is falling, both in energy-intensive and other industries. In fact, there has also been a decrease in energy intensity. This is primarily due to advances in technology. However, this decline is not enough to offset the increasing demand from population pressure. So, if the GDP (gross domestic product) is rising at about 5% per year, there needs to be a 5% reduction in pollution intensity to keep pollution at a constant level. For sustainable development, the reduction in pollution intensity must exceed the growth in the output.

All the policy recommendations regarding economic systems, technology, and institutions converge in charting out a course to reduce pollution intensity at a much faster rate than the output. To reduce pollution intensity there is a need to internalize pollution costs. The extent of reduction in pollution intensity depends on the willingness of an economy to internalize pollution costs.

In order to provide energy for the masses, the country's economy should be on the track of sustained economic growth. It requires a consensus between a society and the international community, a commitment to an appropriate degree of internalization of environmental degradation into the existing economic system. Short-term and long-term measures should work together to achieve this.

Vikram Mehta

Chairman, Shell India Private Ltd, Mumbai, India

A short piece by Ferdinand Bravado in his book *Civilization and Capital* argues that human society progresses by responding to challenge. Today, one of the core challenges that India faces is making energy accessible to the rural masses at an affordable price without undermining fragile ecosystems. We have heard about the need and importance to shift energy systems, about the difficulties that fossil fuels have in meeting demand, and at the same time addressing environmental issues. It must be recognized that energy systems cannot be changed abruptly. They must evolve, and over the past few years there have been three elements in the evolution of energy systems. The first is related to the increasing efficiency of energy usage. Undoubtedly, over the past years, the efficiency of usage has improved dramatically and now, with the onset of information technology, further improvements by way of better design, improved processes, smart appliances, and virtual communication may be expected. The second element in the evolution of the energy system relates to the changing pattern in the usage of fossil fuels. Here again, in response to consumer demand, there has been a fairly radical shift in energy balance. Gas, for instance, is now used far more than earlier and gas is a cleaner and more efficient fuel. The third element of this evolution relates to the use and potential of renewable energy. This is what should be highlighted because it is in the context of renewable energy that India can at least begin to address the challenge of bringing energy to the vast silent majority.

Renewable energy does have problems at present. We should not underestimate the difficulty of making renewable energy competitive with the alternatives currently available. The scale of the effort required is enormous. One statistic suggested that in 2025, if 2% of primary energy was supplied by PVs (photovoltaics), it would mean producing 4000 km^2 of PV panels, equivalent to six times the production of plate glass in Europe today. This is just one aspect of the tremendous challenge that lies ahead in ensuring that renewable energy becomes an affordable energy alternative. There are other issues; for instance, where should wind power be sited? Can we square the use and production of bio fuels with the intensity of agriculture? These are some of the questions that have to be addressed. Also important is the issue of cost.

This brings up the issue of the affordability and availability of energy. When talking about access to energy, we are really talking about how to establish systems to make energy accessible and affordable to the poor. The issues of affordability and availability are not ones that we can overcome without government support. Today, for instance, an SPV (solar photovoltaic) system is beyond the means of most families. But when the combined operation and maintenance costs of running a solar lighting system is compared to the total cost of existing fuel sources such as kerosene for light, SPV systems are not at all uneconomic or unattractive. Calculations show that we can actually achieve a pay-back in two years. The challenge is to provide credit to families so that they can overcome the initial cost hurdle of purchasing the capital equipment. The government should address this challenge through subsidies. But it is important that this element of subsidy does not lead to a distortion in the market place. In India, the government provides subsidies only to least-cost systems. However, these subsidies do not take into account the cost of after-sales service. Customers find many of their systems failing because there is inadequate after-sales support. And that discourages customers from going back or from encouraging others to switch from the existing energy systems to PVs. So a careful consideration is needed of how the initial subsidy can be geared towards ensuring customer satisfaction, which means not just providing for purchase, but also providing for a system by which after-sales services are available.

On the issue of access, the challenge is to create distribution channels. Today, very few distributors and entrepreneurs are encouraged to go into remote rural villages. There are two reasons for this. First, they prefer to be close to their existing base of operations. Second, and far more importantly perhaps, is the need for a minimum density of customers to ensure that they see a return on their investment. And neither of these two factors can be overcome unless the government provides incentives. In Kerala, for example, the government provides a subsidy worth Rs 6000 for the purchase of PV systems; but only if it is purchased through government channels. This limits accessibility, as it limits the incentive for the private sector to invest in distribution channels. The government is an enabler. In fact, it is the private sector that has to play the most important role. Over the years, all the oft-mentioned challenges were really overcome through the initiative, creativity, and responsiveness of the private sector. It is private enterprise that will ultimately provide the technology, distribution channels, and secure financing to make energy available for sustainable development.

Shell is one of the largest oil and gas companies, but at the same time one of the few that has recognized the criticality of sustainable development. In 1997, for instance, Shell set aside 0.5 billion dollars to set up a new core business for renewable energy. Over the past four years, Shell Renewables has set up offices in many countries, including India. In India, the company called Shell India Renewables currently focuses on providing solar energy to families in South India through 'solar service centres'. Its role is not just to provide the panels and the systems but also to ensure that through after-sales services more customers and a market can be created. But Shell India Renewables is a very recent development, only a year old. Shell in Sri Lanka has a longer history; Shell in South Africa has created a company that provides solar systems on a 'fee-for-service' basis. The customer has to make a down payment of $10–20, and then a regular nominal payment, to get an entire solar lighting system for 20 years. Shell has focused on three main areas—solar, wind, and biomass.

The other significant development that Shell has embarked on is the creation of a new charitable foundation called the Sustainable Energy Foundation under the umbrella of the Shell Foundation. This has allocated 30 million dollars for sustainable energy, and the basic objectives of this foundation are fourfold. Its target is the 2 billion people in the world without access to modern forms of energy. The focus is to provide access to energy and the means to efficiently use this energy to provide effective energy services. Companies such as Shell and many others today recognize that energy systems are evolving. By 2050, 50% of the energy consumed by the world will be non-fossil fuel or renewable energy. We are looking towards moving from a carbon-based system to a hydrogen-based system 25 years from now. The whole era of energy systems is witnessing a radical evolution, and Shell knows that it has to be in the forefront.

Nebojsa Nakicenovic

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The diffusion of technologies is an absolute prerequisite for providing energy to the masses. Energy needs to be clean and affordable. In the environmental sense, indoor air pollution and regional air pollution must be reduced. The main reason why energy needs to be affordable is that 1.5 billion people in the world live on an income of less than $1 per day, and a majority is excluded from access to modern energy systems, a pre-requisite for development. The diffusion of new energy technologies requires 20–50 years, but there is no time to repeat the evolution of energy technology once witnessed in the now industrialized countries from non-commercial energy to coal, from coal to oil, and so forth.

Technology diffusion programmes should allow us to leapfrog to what is called the 'top of the energy ladder', going straight from the use of non-commercial energy to modern energy carriers such as electricity, LPG (liquefied petroleum gas), gases from renewables, etc. However, there are many other competing needs for the capital required to introduce these new technologies. Clean water, sanitation, education, healthcare etc. are all necessary. Another challenge is to conceive of a more effective diffusion of new technologies. This problem will be near resolution when the need to distinguish between the concept of technology transfer and technology diffusion is overcome. The challenge is to provide clean energy through large infrastructures, because very high energy densities are needed for the millions in the mega-cities. Also, 70 years from now, with further development, there will be regions with low energy density, probably more compatible with distributed renewable-oriented modern energy systems. Therefore, both these scenarios have to be developed at the same time. These scenarios are based on a set developed for the IPCC over the last three years. Some of the implications of providing energy to the masses can be highlighted. If carbon emissions increase from about 6 giga tonnes today but eventually decline by achieving many of the goals of sustainability, then climate change does not appear to be a big problem. It is also consistent with mitigating emissions which will have to be reduced by only very little to achieve concentrations of about 450 parts per million in the long run. But more interesting are the kind of schemes that depict the provision of energy to the masses more through vigorous economic development. Because development is a leveller, people at the bottom of the socio-economic scale can move up and afford the energy anticipated in this scenario. But in terms of emissions, a wide range of future energy systems are compatible with these developments: from very fossil-intensive ones, using coal, to ones where there is the zero-carbon option biomass and, to some extent, nuclear energy.

The average temperature record from AD 1800 has registered an increase of almost 1 °C. What is interesting is the wide range and rapid increase in mean global temperature for these scenarios, by perhaps 5.5 °C. One of the reasons why the temperature increase appears to be relatively high is that when the world develops and reaches high levels of affluence, emissions of aerosols and soots, in particular sulphur, are assumed to decline. Currently, they have a cooling effect, which amplifies the warming in this scenario. The difference between high increases in temperature and more benign increases in temperature is, to a large extent, due to the technology behind the scenarios.

In all the scenarios, conventional power plants will be phased out over the next three decades. The natural gas combined cycle comprises carbon scrubbing, integrated coal gasification plants, fuel cells, and so forth. The faster these new technologies are diffused, the lower will be their imprints on nature, including emissions ranging from local air pollution to greenhouse gas emissions. However, this is not a trivial task. An example of the successful diffusion of a renewable energy technology in a developing country is the ethanol programme in Brazil. When Brazilians introduced this programme, the price was $150 per barrel, equivalent to roughly over three times the current price of oil at the time. But with increased experience and enormous investment indications, the price steadily declined to one-third, to about $50 per barrel, roughly compatible with the slightly higher level of oil prices today. The investment was enough for this developing country to render this technology affordable at roughly 2 billion dollars. If one looks at the wind and photovoltaic programmes in many other countries, they are of a reasonable order of magnitude. But despite the uncertainty, investments in new technologies must be made to provide affordable energy to the masses.

Antonio V del Rosario

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The Philippines effort to take energy to the rural areas has been expressed primarily through its RE (rural electrification) programme, which has been undertaken by the 119 RECs (rural electric cooperatives) of the NEA (National Electrification Administration). There are other components of this programme, such as the small public utilities group of the National Power Corporation, which is intended for the small and remote islands, and the Department of Energy's integrated village energy system project and its rural photovoltaic electrification project.

The RE programme has been a sustained effort of the Philippines government for over 30 years. By 1990, 119 rural cooperatives had been organized and all the cities and municipalities were energized. 26 610 (74%) villages were electrified and the number of households connected rose to 513 641 (65%) by 1999. There were 9465 villages (26%) remaining to be electrified and 3.3 million out of 7.7 million households waiting to be connected. According to unpublished data of October 2000, the number of unelectrified villages has been further reduced to 21%. Grid extension was rapid during the early years while funds were readily available. Expansion has since slowed down; about 45% of the remaining villages and households are not readily accessible to the grid. There is a low energy demand in remote locations, small islands, or regions with difficult geography. The RECs have carried the banner of energy to our countryside. They account for 90% of municipalities, 85% of the villages, and 52% of household connections, but are now facing long-run instability. The reasons for this are the high cost of delivering electricity, and tariff levels up to 11–13 US cents per kilowatt hour.

As electricity cooperatives extend low voltage transmission lines to these portions of their territorial jurisdiction to fulfil their mandate, these problems have become endemic. Long lines, low loads, and thin markets are the common characteristics of RECs. Collection difficulties are common problems as recipients of power have very low levels of disposable income. There are low margins, poor maintenance, and high systems losses.

Until 1990, no provision for the replacement of reinvestments was recognized in the tariff for RECs. Since then, a 5% limit has been allowed, which is adequate for the large urbanized RECs but not for the rural RECs with low sales. Six out of 14 regions in the country are still operating at high systems losses. This is above the 16% cap set by the government. However, eight out of the 14 regions appear to be making it. The RECs are required to expand service delivery and to improve quality and efficiency in the existing area of coverage. Off-grid, hybrid, de-centralized systems utilizing renewable energy systems such as solar, wind, and hydro power will be a partial solution. But the cost of electrifying the remaining villages, which is estimated at 1.5–2 million Philippines pesos (50 Philippines pesos = 1 dollar) per village, is a barrier to be overcome. The total cost of electrifying the unenergized villages is estimated to run into 14–18 billion Philippines pesos. If the necessary rehabilitation of distribution lines, and the extension and installation of new renewable energy systems in remote areas were included, the investment needed would reach up to 50–70 billion Philippines pesos. It is evident that the government is already faced by a huge budget deficit of 200 billion Philippines pesos this year and is unlikely to carry on by itself in the short term.

Being at the centre of the RE programme, the RECs will have to be strengthened by a combination of long-term financing solutions and industry restructuring strategies. Concessional funding from the NEA is drying up; the RECs will need to undertake internal management reforms for greater efficiency and to attract new funds.

The Philippines Department of Energy has adopted an intermediate solution calling for private sector participation in a joint venture to adopt a village programme named OILAW. It targets about 2000 villages per year up to the year 2004, and has thus far resulted in the electrification of 3090 villages. If private sector investments, technology, and management skills are to be sought on a more sustained basis, appropriate policies will need to be formulated to establish a balance between the affordability constraints in rural energy and the full cost recovery that private sector investments usually demand. A fall-back solution to these distinctly divergent objectives has been suggested. The government should subsidize energy technology and delivery for a limited period of time without creating price distortions or at least restricting them to a minimum.

In its publication, *The challenge of rural energy poverty in developing countries*, the World Energy Council notes that very limited progress has resulted to date from all the efforts made. In its re-evaluation, the following imperatives for rural energy development need to be emphasized. First, policy-makers must accord higher priority to energy, and it must be decentralized to place the rural areas at the heart of planning and implementation. It must be integrated with other measures dealing with agriculture, education, infrastructure, and social and political factors.

There are many modes of subjection to poverty. Some entail grinding circumstances; some, perhaps by the happenstance of nature, a milder climate with an abundance of life-giving water. In both instances, a barter economy rather than a money economy may exist. Electricity from the grid and its cash payment corollary may not work very well in these contexts without the support of other elements of comprehensive and sustainable development. To break the bonds that bind them to poverty, 5 million people from the Philippines have gone overseas as contract workers or to cities. There is a need to empower communities where new renewable energy technologies are being introduced. This may happen by using locally available materials or by involving communities themselves in the application and implementation of these different new technologies. There is a further dimension to the development that comes from logging; it is illegal where it is strip cutting. There are problems of erosion that ultimately destroy the ability of rural communities to produce more. As development programmes are introduced to communities in the countryside, it is important to care for those who have achieved a harmonious balance with their environment. In their simplicity of living, they may be judged as poor by the tests usually used to measure poverty, thus disrupting a richness not readily found even in the developed world. This is especially true with respect to indigenous communities who have lived in their remote villages and forests for centuries. Sustainable development must make some room for them and their environment. To destroy their habitat is to destroy them and a vital part of our ancestral memory.

Summary of the questions-and-answers session

Discussions in this questions-and-answers session started with a comment that in developing countries like India, huge quantities of coal are currently being burnt inefficiently, thereby causing serious environmental problems. A participant hoped that in future coal would be burnt in as clean a manner as possible. Emerging technologies are available to convert this hope into a reality. He made a plea that these technologies be made eligible within the clean development mechanism, for if they are excluded developing countries will continue to burn coal in an environmentally inefficient and unacceptable manner. Prof. Umberto Colombo agreed with this, especially as 50% of India's energy needs are met by burning coal.

Mr Vikram Mehta said that it was imperative to find some means by which the initial cost hurdle on renewables could be overcome. He said that once the initial hurdle had been overcome, the total cost of purchase, operation, and maintenance of these systems would be much more economical than at present.

The topic then shifted to financial support for the rural sector. If finance and subsidies are not available then the best way is to involve the community and marry available materials to appropriate technologies. For electrifying villages, the focus should not be just on the supply of electricity, but more on its efficient utilization.

Keynote, Luncheon, and Dinner sessions

Keynote addresses

Keynote address 1 by *Mr Maurice Strong*

Keynote address 2 by *Mr Michael Zammit Cutajar*

Keynote address 3 by *Mr Mark Malloch Brown*

Keynote address 4 by *Dr Sam Pitroda*

Keynote address 5 by *Mr Tsutomu Makino*

Keynote address 6 by *Nobel Laureate Prof. Paul Crutzen*

Keynote address 7 by *Dr Karan Singh*

Luncheon addresses

Luncheon address (8 February 2001) by *Wakako Hironaka*

Luncheon address (9 February 2001) by *Gilbert Parent*

Dinner addresses

Dinner address (7 February 2001) by *Antonio V del Rosario*

Dinner address (8 February 2001) by *P Chidambaram*

Keynote address 1 by

Maurice Strong

President of the Council, University for Peace, Costa Rica

Chairperson's opening remarks by
K Raghunath, former Foreign Secretary, Government of India

I would like to draw attention to a point relating to Mr Maurice Strong's career, which strikes me as being particularly relevant in the context of the Delhi Sustainable Development Summit. Over the last three or four decades, there has been a certain quickening, deepening, and broadening in the movement of national- and global-level attacks on the problems of poverty and sustainable development, resulting in steady progress in clarifying concepts, enunciating principles, smoothening out contradictions, and striving for consensus. This trend is reflected in the statements, actions, and policies of governments, in the growth of technology, and, in particular, the activities of the United Nations and associated bodies.

Mr Strong has had a very long and pioneering association with this progression, as reflected in his work at the national and international levels, in the United Nations, and in his association with the corporate sector and the government in advisory roles. He was present at the initiation of this process symbolized by the Stockholm Conference;[1] in the intensive run-up to the Brundtland Commission;[2] and, of course, in the peak event–the

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[1] Held during 5–16 June 1972 in Stockholm, Sweden, the United Nations Conference on Human Development was the first global effort to place the protection of the biosphere on the official agenda of international policy and law. It was the first global environmental conference held by the United Nations.

[2] Another name for the World Commission on Environment and Development, a UN agency commissioned in 1983 to assess global development and associated social and environmental problems. Headed by the then Prime Minister of Norway, Dr Gro Harlem Brundtland, the Commission conducted public hearings throughout the world during 1983–87 to review the concept of sustainability. In the Commission's unanimous report (Our Common Future) was coined the world's best-known definition of sustainable development as 'development that meets the needs of the present, without compromising the ability of future generations to meet their own needs'.

Delivered on 7 February 2001

Rio Summit.[3] Rio was a historic landmark, which produced documents of great elegance and substance. Mr Strong brings with him not only a very contemporary expertise, insight, and knowledge but an equally important sense of movement, direction, and progress as well as the historical depth and perspective, which are vital to our understanding and to evolving guidelines for action.

Now, I would turn to flagging a few basic questions or comments made in the capacity of a citizen and a layman. These questions would occur to anybody who deals with the interconnected issues of poverty and sustainable development and constantly studies these issues in a public spirit. The trends, events, policies, decisions, facts, and figures that are being increasingly well-documented on development and environment do not cease to cause the deepest concern and alarm. The question is what really is preventing us from getting on with eliminating poverty and putting the world firmly on the path of sustainable development. It is easy to conclude that given human perversity, aggressiveness, and violation of the law, there is enough for everybody's need but not for everybody's greed. The power structure may be seen as an impediment in the implementation of these objectives. A more charitable view may be that while these problems have been dealt with good intentions, there is a fatal and tragic flaw in our efforts that prevents us from getting on.

It may be appropriate to introduce a Biblical injunction or reminder that you should always have the poor with you. There is a clear demand for attempts to resolve the classic tension between equity and social justice, growth and efficiency as against humanity and equality, socialism and the market, utility and ethics. These contradictions are perhaps contrived and can be resolved. The contradiction between economics and politics and between development and conservation can be seen as part of a steadily expanding human consciousness. The human mind is capable of setting up structures which will pave the way and enable us to see the agenda and the path before us more clearly. Our agenda is now beginning to be implemented and the accumulated experience of the past centuries can help us in avoiding mistakes. While equity, justice, etc. are essential elements, they are all part of the basket of virtues and one cannot be excluded at the expense of the other. What also needs to be emphasized is rationality, which should dictate to us that all these concepts should be really harmonized and that the gap should be bridged quickly.

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[3] Another name for the United Nations Conference on Environment and Development, the Earth Summit was held during 3–14 June 1992 in Rio de Janeiro, Brazil. It was a culmination of international concern on the global environment, providing an opportunity for many heads of state to reach consensus on promoting sustainable development by integrating the linkages between environmental, economic, social, and development priorities. The Summit attracted over 100 heads of state and 20 000 persons from non-governmental organizations and related professional groups. It produced the following three documents and two treaties—the Rio Declaration on Environment and Development; Agenda 21; the Statement on the Sustainable Management of the World's Forests; the Convention on Biological Diversity; and the Framework Convention on Climate Change.

This thought is reflected in the Rio document, which reflects rigour in thinking applied to a world that is irrational, stochastic and full of random processes. We must be realistic and sober when we attack the problem of poverty and sustainable development. This problem includes an enormous number of variables and is a managerial nightmare, but ultimately there has to be a way of harmonizing them and dealing with all of them simultaneously and concurrently. This thought should inform those dealing with the problem in operational terms. The creation of wealth may be necessary but the tensions and conflicts created by efforts to acquire wealth must also be addressed head-on and not pushed under the carpet or dismissed as mere agitation.

In a globalized situation, it is necessary for sovereign states and societies to confidently put forward their ethos and value systems. This is the spirit in which India has been engaged, for example, in the climate change negotiations. While shaping the process of globalization, they must also safeguard their strategic autonomy. In specific issues, like corporate responsibility, the UN Secretary-General has mentioned a compact with the corporate world based on three issues—labour, human rights, and the environment. It is also important to encourage, through commercialization and mobilization, a proper adaptation of the opportunities offered to us by science and technology.

To conclude, I would draw attention to the several philosophical questions on matters relating to poverty and sustainable development. By philosophical, I do not mean academic or remote. On the contrary, philosophy is the most practical and applied of all human activities. In questions relating to equity rights, there is an opinion that while the poor and the disabled have in principle access to policies being put in place, the next stage is actual access. There are also questions relating to modernity and tradition, notions that must be the subject of a rational exercise of the human faculty. Traditional practices, for example, in farming and in industry, have a certain vulnerability but there is also a continuity. These practices have had a purpose all these years.

Keynote address

The Delhi Sustainable Development Summit promises to be a landmark event on the sustainable development calendar. It could be called the principal launching point on the road to Johannesburg (Rio + 10)[4] in 2002. I have long been an admirer of India, and its pivotal role in moving the global environment and development agenda forward by linking it to the issues of hunger, poverty, and population that are central to the concerns of the developing world.

In 1972, at the Stockholm Conference, the influential speech of India's then Prime Minister, Mrs Indira Gandhi, more than set its tone and direction. Her memorable statement – 'poverty is the greatest polluter' – has become one of the best-known and most widely quoted in the folklore of the environmental movement. After Stockholm, never again could the environment issue be considered only in the narrow context of the pollution problems of the rich. It is inextricably linked with the development needs and aspirations of developing countries and with the imperatives for new dimensions of cooperation and equity and the North–South relationship. This legacy continues to form the basis for the agenda of this summit.

It is now 30 years since representatives of 113 nations assembled in Stockholm in June 1972. Initial statements revealed wide gaps between the presentations of various countries, particularly, between the perceptions of the North and the South. The consequent headline in the conference newspaper stated 'Only a hundred and thirteen earths'. In follow-up sessions, we may say that the number has since multiplied but the perception that after all it is only one earth has also deepened and become more of an imperative. The Stockholm Conference placed the environmental issues firmly on the global agenda and provided the political impetus which led to proliferation of national actions and the convening of various global conferences on related issues, especially sustainable development, which is the synthesis of the socio-economic and environmental dimensions of the development process and provides the broad framework in which economic, social, population, gender, and human settlement issues can be seen in their essentially systemic relationship to each other.

Despite the progress in many areas following the Stockholm Conference, it became evident by the mid-1980s that, overall, the environment was still deteriorating and being driven by population growth and continuing wasteful patterns of production and consumption in the North. In response, the UNGA (United Nations General Assembly) established the World Commission for Environment and Development under the chairmanship of Norway's then Prime Minister, Dr Gro Harlem Brundtland. The Commission's recommendations provided an important input to the decision of the UNGA to hold another UN Conference on Environment and Development in June 1992, the 20th anniversary of Stockholm. This event has since become universally known as the Earth Summit. Held in Rio de Janeiro in June 1992, it produced the *Agenda 21*, which, with all its weaknesses and deficiencies, is a product of intense negotiations. It is the most comprehensive agreement reached by the governments on the future course of development of the planet as a whole. It was never considered to be a static document but one to which we must continually add.

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[4] This will be a special meeting of the UN General Assembly in September 2002 in Johannesburg, South Africa to highlight the 10th anniversary of the Rio Summit. The agenda for this meeting is under development. Unlike the Rio Summit, it is unlikely that the governments will negotiate new conventions. More details can be accessed at <www.johannesburgsummit.org>.

The Earth Summit produced the Rio Declaration of Principles, but did not go as far as the Earth's Charter, the development of which we have now taken over as a people's process. Millions of people around the world are busy embracing it, disseminating it, and hopefully living by it. The Earth Summit also produced historic conventions on climate change and biodiversity and launched a negotiating process, which led to an agreement on the Convention on Desertification, an issue of special importance to many developing countries particularly in the arid regions of sub-Saharan Africa.

India has been one of the most influential nations in shaping these international negotiations by taking a lead in promoting the interest of the developing world and the implementation of the agreement that followed. From Stockholm through to Rio, India has championed the shared concern of most developing countries that inadequate availability of financing for sustainable development and inadequate access to technology remain the greatest impediments to alleviating the hunger, the poverty, and the environmental degradation, which continue to plague developing countries. However, today, developing countries are leading the revitalization of the global economy and growing again.

India's real GDP (gross domestic product) has sustained a compound annual growth rate of approximately 6.5% over the past 8 years—a performance that makes its economy the fastest growing amongst the world's democracies. Indian software exports have increased at an annual rate of 65% over the same period and agricultural production by 4%, well ahead of the 1.8% pace of population growth. Foodgrain output has trebled in the last 30 years as noted in *The Economist's* survey of the global economy several years ago. China is expected to replace the United States as the world's largest single economy by 2020, and 9 of the top 15 economies of the world will be what we call developing countries today. India would replace Germany as the fourth largest economy. The same survey projects that the developing countries, share of world output will grow to 62% by 2020, while that of the rich industrialized countries will decline to 37%. While the particulars of these projections are subject to change, they clearly point at the direction in which the world economy is headed. The G-7[5] which today does not include a single developing country, is clearly becoming an anachronism. The institutional structure at the global level today is based on the geopolitics that emerged from World War II. It is a geopolitics that simply does not reflect today's reality. The recently-formed G-20[6] is a promising step in addressing this imbalance.

We cannot rely on an overall increase in GNP (gross national product) as an indicator of human development; the UNDP's (United Nations Development Programme) *Human Development Index* makes that clear. Economic growth is essential to and does have the potential to reduce poverty but equating growth with poverty reduction is much too simplistic. India did not see a consistent drop in poverty between the 1950s and 1970s. Despite a reasonable economic growth in the 1980s and 1990s, the number of income poor has actually increased due to population growth. Between 1951 and 1994, the number of income poor doubled from 170 million to 340 million. The disparity between increases in GNP and actual numbers of poor is mainly due to the historical focus on the expansion of total economic output rather than on its distribution. In today's knowledge-driven economy, the principle sources of comparative advantage and added value are knowledge-based technology and the skills and capital required to develop and deploy them. In this, the developing countries face, in many ways, another generation of disadvantage. Fortunately, India is one of those countries that is overcoming that disadvantage largely due to the emphasis it has placed on education and science and technology.

Energy is at the very heart of the sustainable development challenge as it is essential to growth. Fossil fuels, being the principal source of climate change, threaten not only the future of our economies and their sustainability but the very future of life itself on earth. Yet there is a continuing reliance on fossil fuels, for which there is no general substitute. There are alternatives in renewable energy like solar power but none can actually substitute fossil fuels as the mainstream source of energy supply. One of the most fundamental challenges that we face is to achieve a combination of more efficient use and massive international efforts to develop valuable alternatives. The Green Revolution[7] clearly helped agricultural growth in India. Even with its disadvantages, it enabled India to become self-sufficient. Countries like India face a mammoth challenge despite the progress they have made. Feeding an increasing population without over-reliance on external supplies has clearly been a challenge. Doubling world food production by 2025 will be a formidable task, but even more daunting will be the challenge of ensuring that poor people in food-deficit areas receive the quality and quantity of foods they would require for their basic subsistence. While it will be possible to produce food in such large quantities, the real issue is how to match food availability with food needs, particularly of the poor. Conversely, even in times of food scarcity, those with resources can easily obtain it and do not go hungry while even in times of food abundance, those without the means are often hungry and malnourished. Poverty, more than the lack of food availability, is what denies many the access to the food they need.

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[5] G-7 or Group of Seven is an informal discussion group of economics ministers (including the US secretary of the treasury) from the major industrialized nations (and market economies) of Canada, France, Germany, Italy, Japan, the UK, and the US.

[6] Formed on 25 September 1999 in Washington, DC, G-20 or the Group of Twenty is an international forum of finance ministers and central bank governors representing 19 countries, the European Union and the Bretton Woods Institutions (the International Monetary Fund and the World Bank). The G-20 promotes discussion, and studies and reviews policy issues among industrialized countries and emerging markets with a view to promoting international financial stability. Member countries include Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, the United States, and the European Union.

The availability of potable water is another issue with potentially explosive consequences. One of India's leading dailies, *The Hindustan Times*, recently commented on the fast deteriorating water situation in India. The water table is stated to be falling almost everywhere, with wells drying up by the thousands. It is said that if the population continues to grow as it has been, it is certain that a major part of the country will be in the grip of a severe water famine in 10–15 years. This summary of the constraints and vulnerabilities demonstrates the fact that the process of moving towards a sustainable development path has just begun. Frankly, it has begun all too slowly. As we move into a new era of economic growth, developing countries have a rare opportunity, and I would say an absolute need, to fashion their own development model.

No country is in a better position to take the lead in creating this new development model than India, because of the strengths and experience of its democracy, its diverse natural resource base, its formidable scientific and technological capabilities, its well-developed industrial sector, and its entrepreneurial tradition. The quality and the strength of India's institutions and professional cadres, its commitment to education, and its high degree of environmental awareness add to this. India can learn from the rest of the world but the rest of the world also has much to learn from what is happening in India. No country has a greater need to fashion its own development model than India, for it must prepare to accommodate, in its rich but limited territory, at least one and a half billion people before its population stabilizes towards the middle part of the 21st century. Can we really ignore the situation in which replication of the western model would reduce the proportion of India's population employed in agriculture from the present level of 62% to, let us say, 5%? Think of what this would do to India's already overstrained cities, and even more important to the lives of the people who would be seeking livelihoods in a modern sector that could not possibly accommodate the level of influx.

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[7] The Green Revolution spanning the period from 1967 to 1978 changed India from a starving nation to one of the world's leading agricultural nation.

Ecologically, India is rich as a home to more than 45 000 plant species, several thousand of which are found nowhere else in the world. Its rich biological diversity, which is a great resource, is under great pressure today. With acceleration of development, India will be contributing more and more to the larger global risk such as climate change, degradation of biological resources, and loss or deterioration of arable lands. China has already become the second largest source of carbon dioxide emissions and will almost certainly succeed the United States to the dubious honour of becoming number one. India, with its booming economy and population, will not be far behind. The prospect of massive increases in the Third World's energy consumption over the next 30 years underlines the point that it is the industrialized world that must reduce its environmental footprint in order to leave space for developing countries to meet their needs and aspirations. There is overwhelming evidence that the industrialized world cannot continue on its historical patterns of production and consumption. Neither can developing countries be denied the right to grow, nor can they be expected to respond to exhortations to reduce their population growth, and adopt stringent environmental controls from those whose patterns of production and consumption have largely given rise to such global risks as climate change. It is the special responsibility of the industrialized countries to ensure developing countries the access to the capital and technologies they require for their transition to sustainable development, and to cooperate fully in measures that will secure our planet's future.

Much of the environmental degradation and poverty that we experience exists in the urban areas. Paradoxically, the urban areas are growing precisely because they are the places to which people go when they want to escape from the poverty of rural areas. Increased urban growth is, therefore, both an answer and a problem. Pandit Jawahar Lal Nehru (the first Prime Minister of

India), made an interesting statement about urban environmental degradation. He commented on the paradox in an article headed *The Strange Behaviour of Money*, in which he spoke of the extraordinary spectacle of abundance and poverty co-existing in urban areas. If capitalism is not advanced enough, some other systems must be evolved more in keeping with science. In a recent article in *The Economist*, hardly a radical publication, it has been stated that if the Marxist prediction of a proletariat plunged into abject misery under capitalism has so far been unfulfilled, the widening gap between the haves and the have-nots is causing some to think that Marx might yet be proved right on this point after all. India now has a historic opportunity, one not likely to ever recur, to establish a new sustainable development model based on a synthesis of Gandhi's principles of Sarvodaya and people-centred rural development with Nehru's commitment of science, technology, and modernization. Effecting this will require an enlightened and sustained political will.

It is an ominous paradox that while evidence of continued deterioration becomes more compelling, the will to deal with them is weakening. The lack of political will is based on the lack of adequate motivation and economic incentives for the governments. An important initiative that governments can take up to promote sustainability is the review and revamp of the entire system of fiscal subsidies, taxes, regulations, rewards, incentives, and constraints that motivate the behaviour of the private sector, corporations, and individuals. To mobilize the resources of civil society and industry, it is essential to provide positive motivations for sustainable behaviour.

Population is a much more complex issue than many in the North believe. Population growth is a major issue for those countries that are experiencing it and must manage the pressures it creates on scarce land and resources to meet the needs and expectations of their people on a sustainable basis. It is not an easy issue because the reverence for life, including plant and animal life, is deeply entrenched in India's traditional value systems. However, to confine people to a life of poverty and suffering is neither just nor necessary. There is no doubt that India could support its present and projected population at a level that will enable all to enjoy reasonable standards, but that will take monumental changes in the ways in which resources are developed and deployed. The capacity and the emerging will of India to do this are encouraging. Although India is among the countries which are at the vanguard of environmental protection, the added burden from its increasing population and the economic growth essential for poverty alleviation presents a tremendous strain on the country's ecological endowment. The constraints are already evident in the depletion and contamination of groundwater, and the loss of soil and forests.

As custodians of most of the world's biological resources, on which the sustainability and well-being of the world community depend, developing countries like India provide products and services that are necessary to the continued integrity and sustainability of the earth's resources and life support systems. Unfortunately, the indispensable services that they provide have always been taken for granted and treated as free goods. An economic value must be placed on them if we are to expect developing countries to maintain them largely for the benefit of the rest of the world. One of the most disappointing trends since the Earth Summit is the lack of response by Organisation for Economic Co-operation and Development countries to the needs of developing countries for additional financial resources and real equity in technologies. It is particularly discouraging that progress towards meeting these needs has actually suffered setbacks since Rio as donors have reduced their official development assistance. All the trends currently point to further reductions, accompanied by the diversion of resources (that might have been available for development assistance) to meet growing emergency and humanitarian needs. In some ways, the demise of Euro foreign aid will be welcome by both donors and recipients. A more fairer system of resource transfers, based on valuing the services and products and the importance of the developing countries' contributions to the world community, is important.

Positive developments are visible in Indian industry and business. Though not numerous, there are examples of a strong commitment to sustainability. Even with the profound changes driven by technology, the 21st century is likely to see the re-emergence of basic traditional issues with significant potential for conflicts. These include access to water, food, energy, land resources, and livelihoods. We may have become dangerously complacent about food security. In a world which produces more than enough food to feed everyone, it is a scandal that people are still hungry and malnourished; it is an affront to the moral basis of our civilization. Peace and security are indispensable preconditions to achieving sustainability and overcoming poverty. War and violent conflicts within and amongst nations effect devastating damage to the environment; the human cost of such wars and conflicts goes far beyond the immediate deaths and sufferings by destroying and undermining the resources on which even larger numbers of people depend for livelihoods. This essential link between peace and sustainable development is the reason behind revitalization of the University for Peace and its strategic partnership with the Earth Council. The radical changes now occurring in society are producing a historical convergence of traditional perceptions of relationships between the practical aspect of human life and its moral and spiritual dimensions.

Ethical, moral, and spiritual bases must provide the underlying motivations for our policies and actions. The Earth Charter attempts to articulate these on the basis of millions of inputs of the people. Globalization is a phenomenon that is much debated as to its benefits and costs. Clearly, democratic market capitalism, which is driving the processes of globalization, must find ways of dealing with these emergent dilemmas or risk becoming the victim of its own success. It must become just as effective at meeting society's needs and ensuring a sustainable future as it is in generating economic growth. A large section of society is still denied the ability to participate in the benefits of the prevailing system. That system cannot endure a mercantile society; however successful it may be in material terms, it will not be sustainable. 'Civil society' is a term that has come into wide usage now but it describes a phenomenon that is not new to India. It was civil society and people-based movements that gave rise to Indian independence and played a key role in shaping the Indian nation and ensuring the continuity of its principles and values.

The principles that Mahatma Gandhi espoused and died for inspired the hopes of all developing countries and evoked the respect and esteem of the world community. Those principles will come back into much more respect and prominence in the period ahead because they must get allied with the techniques and technologies produced by modern science and knowledge. A new development model based on a synthesis between these would be one of the most important contributions that India could make to its own future and that of the world community. These principles provide the historic and moral foundations on which those who have succeeded them in the leadership of this great nation are now working to fashion a more peaceful, equitable, and sustainable future for India and for all the peoples of our only one earth. Sustainable development, therefore, is not an end in itself but the indispensable means for achieving a secure and sustainable future in which all can share equitably. It is only by sharing that responsibility that the scourge of poverty and the inequities in the relationships between the rich and the poor can be achieved. Only through that achievement can there be a secure and sustainable future for us.

Chairperson's concluding remarks

Mr Strong has provided a rich fare packed with up-to-date information. His professional presentation was both realistic and uplifting. The optimistic note that underlined his address was that we should all look to the future. A few points that he made should provide an accent for the remaining sessions of this summit. He hoped and prognosticated that India can take on the challenge of food production and economic growth, which provides the basis for poverty alleviation and sustainable growth. He elaborated on the ethical aspect that there should be no contradiction between the old tradition of utilitarianism and welfare economics, which traditionally has been based on the idea of utility. He also mentioned the need to promote renewable sources of energy, which is an important dimension of sustainable development. Moving around the world, one observes that the problem of sustaining consumption is not limited to the developing world. A growing concern of the more affluent countries is how they can sustain their own lifestyles.

Summary of the questions-and-answers session

One should bear in mind that as countries emerge as new powers in the world economy, they would still be poorer than the traditional industrialized nations. The fact that they grow in aggregate terms to world level status is not going to ensure that their people reach the standards of living that are enjoyed by the industrialized nations.

The United Nations University for Peace, Costa Rica, has involved leaders of virtually every major religious and philosophical movement and the design is not to try and come up with a universal set of ethical and moral principles that apply to everything but rather to distill traditions that are diverse in many of their particulars. The issue is of identifying universality of principles.

India has immense experience and expertise in the field of energy but is beset by many problems. Its economy is growing and so is its population and every citizen has increasing expectations from it, thereby needing increased economic growth and consequently, more energy. India would need base load sources, hydroelectric power, etc., because renewable energy can supplement the need for base load energy but cannot replace it. Thus, there will be a need to have a proliferation of small-scale energy sources, village-level energy sources using both energy and modern technologies. Fossil fuels are not the answer to increase basic energy supplies—coal is cheap and found in abundance but it comes at high environmental and health costs. Nuclear energy is not a miracle cure. So, India, like the rest of the world, does not have any real answer of meeting energy needs in an environmentally sound manner. The challenges of producing electricity and other forms of energy are monumental. India has not solved them, neither have Canada nor the US. Twenty five years ago, when the world was faced with an impending food crisis, the Consultative Group on International Agricultural Research was formed to promote research of better varieties of foodgrains and to promote their dissemination and use. Mr Maurice Strong wondered why a similar group could not be established for (clean) energy. A global effort to mobilize the R&D efforts and to foster their application in all countries is 'one of the most practical things we can do.'

The Earth Charter is the basic statement of ethical principles. It is designed as a basis against which countries can test their own values, commitments, and corporate/individual behavioural patterns. It is designed not as a sacred wreath but as a guide to ethical and moral conduct in institutions and individuals.

Keynote address 2 by

Michael Zammit Cutajar

Executive Secretary, United Nations Framework Convention on Climate Change,
Bonn, Germany

Poverty: the global challenge for governments, industry, scientists, and civil society 133–141

Chairperson's remarks by

Akio Morishima, Chair of the Board of Directors, Institute for Global Environmental Strategies, Kanagawa, Japan

This session will focus on the global climate change negotiations. Unfortunately, in November 2000 at the Hague, the COP-6[1] (sixth session of the Conference of the Parties) could not reach a productive agreement and was postponed by six months to the so-called COP-6.5. A major hurdle to COP-6 not reaching a conclusion, despite the sincere effort made by the President of the Conference, Minister Jan Pronk,[2] is that the North and the South could not get together to formulate a partnership. I hope the Delhi Sustainable Development Summit 2001 can provide some indicators to resolve this division between the North and the South. If we cannot be successful in ratifying the Kyoto Protocol, then in the 21st century, our younger generation and the following ones will face a serious threat to life.

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[1] The COP-6 was the sixth in the series of sessions of the COP (Conference of the Parties), the supreme body of the United Nations Framework Convention on Climate Change. The COP comprises over 170 nations that have ratified the Convention and meets in annual sessions, the first of which was held in Berlin, Germany, in 1995. The COP promotes and reviews the implementation of the Convention in light of its objective, new scientific findings, and the effectiveness of national climate change programmes.

Despite intense negotiations at the COP-6 organized in The Hague, The Netherlands, during 13–24 November 2000, delegates failed to agree on operational matters of the Kyoto Protocol, primarily due to American and European disagreements over a number of issues relating to carbon sinks, compliance, and supplementarity. Negotiations will resume at the COP-6.5 slated for 16–27 July 2001 at Bonn, Germany.

[2] Mr Jan P Pronk is the Minister of Housing, Spatial Planning and the Environment, The Netherlands. He presided over COP-6, the sixth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change.

Delivered on 7 February 2001

Address by
Sujata Gupta, Director, Policy Analysis Division, TERI, New Delhi, India

Global climate change negotiations: TERI's perspective

I will briefly examine the issue of sinks, discuss a subject of relevance to developing countries, namely the CDM (clean development mechanism) and its future in the event of the Kyoto Protocol not being ratified, and go on to look at longer-term issues.

Though negotiations on climate change have come a long way, they are still distant from any conclusive agreement. No consensus was reached in November 2000 at COP 6 in The Hague. Negotiations were primarily restricted to those between the European Union and an umbrella group led by the United States of America. President Pronk attempted a compromise document touching upon the important issues but to no avail as yet. Still there is hope and the likelihood of some headway at a resumed COP-6.[3] Mr Pronk's proposals summarized four main items: (1) capacity building and technology transfer; (2) mechanisms;
(3) land-use, land-use change, and forestry; and (4) compliance, accounting, reporting, and review. I would limit myself to the issues of land-use, land-use change, and forestry; and mechanisms.

Sinks have become a major political issue while the uncertainty regarding their science has been resolved to an extent with the production of various scientific assessments and reports. The debate associated with sinks are perceived by many as a softening of commitments by a few major Annex B Parties.[4] This implies that these parties are using enhanced sinks as a cushion to avoid meeting their real commitments. Sinks or forestry projects have been proposed as CDM projects in the compromise document but these clearly are not acceptable, primarily because the permanency associated with carbon sequestered in these projects is uncertain. An examination of the national communications submitted by the Annex B Parties reveals the contribution of carbon dioxide sequestered in forests as a percentage of the total emitted by a particular country. In 1990, the US accounted for around 24% of its carbon as sequestered in forests; the figure is as high as 14% even in 1998. In the case of Russia, because of a decline in carbon dioxide emissions from other sources due to a decline in economic activity, this percentage increased significantly from 16.5% in 1990 to 56.2% in 1998.

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[3] Following the failed negotiations in The Hague at COP-6, the session will resume as COP-6.5 slated for 16–27 July 2001 at Bonn, Germany.

[4] Annex B in the Kyoto Protocol lists those developed countries that have agreed to a commitment to control their GHG emissions in the period 2008–12, including those in the Organization for Economic Cooperation and Development, Central and Eastern Europe, and the Russian Federation.

If one looks at the increase in GHG (greenhouse gas) emissions over 1990–98, excluding sinks, the US has an increase of 11.2%, but including sinks, it shows a decline of 1.6%. These numbers highlight the importance of sinks and explain the debate generated and emergence of these as a political issue. Sinks can be a mechanism to show evidences of net reduction.[5]

Moving on to the issue of entry into force of the Kyoto Protocol,[6] it is essential for at least 55 countries to ratify it. Also, Annex 1 (or developed country) Parties ratifying it should account for 55% of the 1990 emissions of Annex 1 Parties. In 1990, the US accounted for one-third of the total emissions by Annex 1 countries. The position of the US is not clear but there are clear indications that it is unwilling to accept the targets, which have been set out in the Kyoto Protocol. Without the US ratifying the Kyoto Protocol[7] the most optimistic outcome would be a partial ratification or a partial implementation of the Protocol. For developing countries, the CDM may help in development and in controlling the problem of emissions in the long term.

Take a scenario of CDM without ratification or with partial ratification. Clearly, there would be a lower value due to a lower demand for the carbon emissions reduction units coming out of a CDM project and higher risk for those who undertake these projects in case there is no future agreement. As a result, the CDM could be much further reduced in size. However, we are optimistic that the CDM will survive as much effort has been put in its development and many parties are interested in protecting the environment. There are three not mutually exclusive possibilities. One, some CDM projects will take place despite no ratification in the hope that there should be future ratification under the Framework Convention on Climate Change. Two, there may be bilateral, multilateral, or regional agreements to achieve the Kyoto objectives but this could be restricted to a few regions. Three, voluntary initiatives could occur. Some corporates have shown leadership in this issue, hopefully, such activities would be contagious. Given the low probability of immediate ratification, to sustain CDM it would be desirable to formulate a plan with well-defined rules and an institutional structure. Since this too is unlikely, we could work towards a minimum set of rules for operationalizing the CDM without ratification. These could include a positive list of non-controversial projects and transparent reporting procedures to enable post-certification of early CDM projects for those who have shown initiative and undertaken the risks.

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[5] The Kyoto Protocol did not define the extent to which different types of sinks could be included in estimating national emissions.

[6] The Protocol, on entry into force, would require countries listed in its Annex B to meet differentiated reduction targets for their emissions of a 'basket' of 6 GHGs relative to 1990 levels by 2008–12. It was adopted by all Parties to the Climate Convention in Kyoto, Japan, in December 1997. The Kyoto Protocol is yet to be ratified.

[7] In March 2001, the US withdrew from the Kyoto Protocol and refused to ratify it.

Moving on to long-term issues, there is a clear disparity between per capita emissions and the total level of emissions. India, despite being the fifth largest emitter in the world, does account for one-fifth of the world's population. Its emissions in terms of per capita emissions are relatively small. It may be ranked fifth in total emissions but on a per capita basis the emissions by an average American are 22 times those by an average Indian. Given this background, and the demand for meaningful participation by major developing countries, which is quite likely to surface or I should say resurface, we must look at the longer-term scenario. It is necessary to assess the level of commitments expected from both developing countries and developed countries in the longer-term. Developing countries have to be allowed to increase their emissions such that their growth process is not constrained and developed countries have to reduce their emission levels. Developing countries' emissions have to increase prudently as they cannot follow the emissions intensive path of the developed countries. Developed countries have to initiate immediate action to restrict their growing emissions. This brings us to the question of supplementarity.[8]

For now, quantification of supplementarity has been postponed till the year 2005. No concrete numbers have been fixed; it has been said that Annex 1 Parties should show demonstrable domestic progress towards achieving the Kyoto targets and that this could be reviewed in 2005. The supplementarity debate stems from the juxtaposition of economic efficiency and environmental concern. Economic efficiency requires that measures to reduce carbon emissions should be undertaken in places where they are cheaper. However, this works contrary to environmental concerns, especially in the long term. Supplementarity is essential to promote domestic action in Annex B Parties and to *initiate* the process for progressive reduction in Annex B emissions. The Kyoto Protocol is the first step to initiate such domestic action. No cap on acquiring these reductions outside the economy may result in an unaltered increasing trend in domestic emissions for Annex 1 parties.

I would like to end on an optimistic note. Several Annex B negotiators at COP-6 recognized that equity is an important issue in the long run, and equity pivoted on the principle of per capita emissions is essential to attain convergence. Also there was broad recognition amongst the negotiators that adverse impacts of climate change impact not only the developing countries but even the developed ones. This has led to a strong commitment to take action.

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[8] The supplementarity issue caps the amount of emission reductions that an Annex 1 party can achieve outside its economy using emissions trading (Article 17), joint implementation (Article 6), and the clean development mechanism (Article 12).

Keynote address

Climate change negotiations: science, economics, and politics

The themes of poverty and vulnerability are common to the human message from Gujarat and the scientific message from the Shanghai[9] session of the Intergovernmental Panel on Climate Change. Although climate change does not have the immediacy of an earthquake, it is what you might call a creeping catastrophe; it steals up on us as we go about our normal lives. The expected adverse effects are well documented—changing patterns of rainfall, storms, and drought, shifts in food production, and the range of epidemics, flooding of island coasts, etc. These adverse effects will most heavily impact those that are least able to resist and adapt. The December 1999 tempest in Western Europe and the ice storms that occasionally occur in North America are like blips on the socio-economic charts. However, in contrast, Hurricane Mitch,[10] the cyclones in Orissa[11] and Mozambique,[12] and the landslides in Venezuela are not only human tragedies but setbacks to sustainable development. Climate change is regrettably yet another factor of inequity in our world.

Four important points in the context of vulnerability and poverty are

1. what do science tell us about climate change?
2. what are the dynamics of the negotiations and why have they stalled?
3. what are the prospects for the resumption of these negotiations?
4. what issues could developing countries like India be looking at beyond the immediate framework of the negotiations?

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[9] Over 150 delegates from around 100 governments met in Shanghai, China, during 17–20 January 2001 to review, approve, and adopt a report of the Intergovernmental Panel on Climate Change titled *Climate Change 2001: the scientific basis.*

[10] From 27 October to 1 November 1998, central America was devastated by Hurricane Mitch, a Category 5 hurricane recorded as among the most destructive in the western hemisphere. It caused over 9000 deaths predominantly from rain-induced flooding, mainly in the Honduras and Nicaragua. Other countries affected were El Salvador and Guatemala.

[11] Termed as one of the most devastating human disasters ever experienced, this supercyclone hit Orissa in the early hours of 29 October 1999 killing thousands and displacing millions. The official number of deaths is reported to be nearly 10 000. Apart from significant loss of human and animal life, the cyclone damaged over a million houses, as many hectares of agriculture land and considerable amount of infrastructure.

[12] On 22 February 2000, the south-east African country of Mozambique was hit by heavy rain and gale-force winds in excess of 75 miles an hour caused by Cyclone Eline.

On science, there are a few points from the Shanghai report. The first is that the evidence of human responsibility for destabilizing global climate is stronger than before. Second, the projection of global mean temperature increases over the period to the end of the 21st century is now in the range of 1.4 °C–5.8 °C. Five years ago, the same network of scientists plotted the upper end of the expected range of warming at 3.5 °C. The upper end is now the mid-point. Global climate is shifting into unchartered directions. While the possible top number is scary, what is perhaps more scary is that we do not know what it means; the results of the change are unpredictable. Conclusions to be drawn from the statements of scientists include what is most important for the country—climate change is already inevitable. Some change will occur in the time taken to turn around the rising trends in GHG emissions even with the best will in the world. Adaptation to climate change must become an intrinsic item on the planning agenda in all countries, rich and poor. It must be a factor of sustainability and an objective of international cooperation. The resilience of people and their livelihoods in the face of climate shocks and the resistance of their habitat must be strengthened.

The third point that feeds into the negotiations is that urgent action must be taken to limit the emissions of GHGs with the rich countries providing the lead. There must be rational and economic avenues for such action available to all countries. Fourth, while science can identify risks like earthquakes and other such calamities, it is political judgment and action that must evaluate this risk and decide on an appropriate response.

The reference to politics brings up the next point—the dynamics of the negotiations. COP-6 in The Hague ended in an impasse. Looking back on 10 years of negotiations, this is the first time that governments involved in the process have failed to meet a political deadline. It is worth reflecting on why the negotiations are now in a hiatus. It was not for the lack of scientific inputs. The complexity of the issues hampered progress. Perhaps the most important point in this was that having passed the 'heroic' stage in Kyoto where a new system was defined in broad terms, the diplomats were faced with the daunting challenge of figuring out details and rules that would hold up to scrutiny in real markets. Also, a number of practical factors went wrong. Cards were played too late and in the last-minute rush, ministers were unable to or had difficulty in assessing the complex options. The proximity of the US Presidential elections did not help.

However, these are not the foremost problems. To my mind, what has always hampered progress in this area, and was manifest again at The Hague, is economic defensiveness. The energy issue goes to the heart of economic growth and the defence of growth options is uppermost in a negotiator's mind.

Secondly, this time around, there was inadequate political investment in success. The two elements reinforce each other when a negotiation that touches upon fundamental economic interests is by and large left to be managed by environmental negotiators. The economic interests should be elaborated. The response measures to climate change essentially require more efficient production and consumption as well as shifts to clean non-fossil fuels, notably in energy and transport. These are generally assessed as economic costs, even when they are justified by expected returns. They may stir up the prospect of social or political (electoral) costs as well, for instance, the reactions in western Europe to high fuel prices in 2000.

The other extreme is the cost of inaction and of letting climate change proceed. Being more distant and more difficult to assess, these do not weigh so heavily on the negotiations. A basic imbalance exists between the attention given to the costs of action and inaction. Consequently, most of the major economic actors (the North and South together) seek to protect their economic growth options by lowering costs or deferring their impact. Hence, they are not driven to quick results. They can afford to wait and see. The poor and the vulnerable are vocal in calling for quick results but do not wield the same economic clout.

With the onset of globalization, positive economic influences are evident from corporations that are positioning themselves to take advantage of the business opportunities that will arise in economies that are shaped by standards, regulations, and incentives to combat climate change. Their leadership and influence could convert perceptions of cost into perceptions of opportunity. They could make the measures needed to combat climate change look like drivers of green innovation, green investment, and green employment.

Prospects for resuming the negotiations must be assessed. It is important that the conference in The Hague was not closed but suspended. Hence, it has to resume. The expectation is that it will resume to negotiate and one option is to do so in May 2001. Significantly, the new administration in the US had asked for more time even before it took office. It needs to line up its negotiators and positions. Consequently, July is an alternative option but there are problems with that too. There will most likely be a resumption of COP-6.5 in 2001.

However, this is not the end of the road. Beyond lies COP-7 in Marrakesh in November 2001 and then in 2002, the United Nations World Summit on Sustainable Development, which should drive moves on the climate change front. Most topics that await agreement by the COPs are related to the rules of the game for implementing the Kyoto Protocol. The key political question concerns the future of the Protocol, which traces the architecture of an international response to emissions limitation. It points the way to successive phases of emissions reduction by developed countries and combines quantitative and time-bound targets for these countries with mechanisms that engage market forces to work towards the targets. Many countries, including industrialized ones like the European Union and Japan, have been working for the entry into force of the Protocol in conjunction with Rio + 10 or Stockholm + 30. The United Nations Millennium Summit supported this hope. However, the US, which is the major emitter, is quite circumspect about this aim.

The US Senate has signalled its opposition in principle to the Protocol. One of the objections is to the incompleteness of its architecture, in that the Protocol does not provide for any commitments by developing countries for emissions limitation. Despite this signal of opposition, the former US administration continued to negotiate on the Protocol. The new one has yet to signal what its stand will be. The only positive sign is this request to delay COP-6.5; this must be interpreted positively as a sign of willingness to participate constructively. The Protocol is by no means a perfect instrument but it can work. To scrap it and start anew would set the global climate strategy back several years if not decades. It would weaken the incentives for domestic action and allow emissions growth to go on unimpeded. There is merit in working with what we have, fine-tuning it through the current negotiations, and completing the structure later.

I would like to conclude with the issues for developing countries, beyond the current negotiating agenda. I will first list four, and then come to the hot potato. First, I reiterate that there must be an assessment of vulnerability to the adverse effects of climate change and pursuit of adaptation measures. Second, domestic win-win measures giving immediate economic and social returns must be exploited. The evident example of such measures is improving air quality in mega-cities through more efficient use of cleaner fuels, leading to positive effects on health and longevity and making a major contribution to emissions limitations. Other win-win opportunities exist in transport and waste management. Third, externally-oriented industrial sectors need to assess the technologies and standards that will make them competitive in a global market influenced by climate policy. This is an area for technological cooperation. Fourth, complementary to the third, the preparation of projects for the Kyoto Protocol's CDM could lead to an important inflow of technology and finance for industrial innovation and adaptation.

The hot potato is that it is time for developing countries to explore proactively the type of emissions commitments that they could accept in the future. Such commitments would have to be consistent with the overriding aims of developing countries—socio-economic development and poverty eradication. Such commitment would also have to be dependent upon demonstrable progress by developed countries in implementing their emissions targets. This question is routinely swept under the carpet in the COPs. Yet, it is evident that a global climate strategy cannot succeed without an equitable contribution to emissions limitation by developing countries. The developing-country parties to the Convention accounted for nearly 40% of global carbon dioxide emissions from fuel combustion in 1997. This share will grow as economic development progresses in these countries.

However, the atmosphere does not distinguish between emissions by source; in aggregate, developing countries are becoming major emitters. On the other hand, action to limit emissions must take account of per capita differences as a proxy for equity. The 1997 data show per capita emissions of approximately 12 tonnes from developed-country parties, 20 tonnes from the USA, and only two tonnes from developing countries as a whole. In terms of 1997 carbon dioxide emissions from fuel combustion, India was the sixth largest emitter globally on par with Germany. Between 1990 and 1997, its aggregate emissions grew by over 50%. In 1990, it was emitting 0.7 tonnes per capita, and in 1997 just under one tonne per capita.

These numbers set the parameters. With political imagination and trust, acceptable outcomes can be discussed. It is encouraging that many developing countries are already contributing significantly to global emissions limitation. They are doing so through efficiency improvements pursued for economic reasons, which are reducing the emissions intensity of national economic activity. Yet these countries have refrained from seeking political credit for these achievements in the climate change negotiations. Qualitative emissions targets, perhaps based on emissions intensity, could be feasible and acceptable. The question I leave you with is whether developing countries and their institutions are ready to take the lead in working them out and to define their own agenda.

Keynote address 3 by

Mark Malloch Brown

Under-Secretary-General and Administrator, United Nations Development Programme, USA

Poverty: the global challenge for governments, industry, scientists, and civil society 143-148

Chairperson's remarks by

Ambassador Walter Fust, Director-General, SDC (Swiss Agency for Development and Cooperation), Berne, Switzerland

I would like to make a few remarks about what we at the SDC (Swiss Agency for Development and Cooperation), from our perspective as a bilateral donor agency, understand by sustainable development. We are convinced that it is intimately related to a few fundamental principles—equity, sufficient economic means of living, and a clean environment.

Of these, it can be argued that equity is the most important. Poverty, in an economic sense, is bearable when inequities are low, when all can participate in social life and in societal decision-making, and when all can breathe the same clean air.

On the other hand, when the rich get richer and the poor have no say, poverty becomes a scandal. This may be witnessed today as economic disparities grow apace worldwide. We cannot accept it; not only is there a sense of concern, empathy, and solidarity, but also the awareness that it jeopardizes the chances of humanity to live in peace and dignity. The mandate of the SDC is to endeavour to change this situation, even though we can make only a modest contribution.

TERI's work contributes to ensuring that a clean environment becomes a reality, not only for the rich (who can afford to live and work in clean places) but for all, mainly the poor, who do not have the same chances or choices about where to stay, where to get a job, and what job to get. The SDC has associated itself with TERI's initiative of a more durable management of energy and environment to benefit the poor. This could contribute to the solution of global environmental problems.

Delivered on 7 February 2001

Keynote address

Making change work for sustainable human development

There is a concern that global collective efforts on development are really not living up to the size of the challenge. We are not managing to keep the environment on the agenda of international policy-makers. At the level of individual countries, there may be a significant difference in terms of quality poverty reduction; some success in income growth may be tangible, particularly in Asia, but the quality of life for the poor across the world is not improving in terms of the important measures—people's access to health and education and people's political control over their own lives and societies. In many ways, we are losing the great battle of development. Perhaps the millennium is an occasion for such reflection because it provides a brand new opportunity for reducing poverty and getting the world on to a sustainable environmental course.

The social science of poverty reduction is extremely interesting. Arithmetically, we can make the case that by 2015, it is possible to meet the goal the development community has set itself of halving the proportion of those living in absolute poverty. The arithmetical case looks relatively plausible. There are 1.2 billion people living on less than a dollar a day. Around 800 million of them live in Asia and 300 million within east Asia, including China. For this region, we have already broadly succeeded in halving the proportion of people living in absolute poverty since 1990, when the international development targets first began to be adopted. The proportion of the East Asian population living on less than a dollar a day has dropped from 28% to 15%. South Asia has seen modest progress, with the proportion having fallen from 44% to 40%. Projecting these estimates to 2015 and assuming that India continues to grow at some of the better annual growth rates of recent years with improved impact on poverty reduction, it is again plausible to assume that south Asia would also be able to reach the target of lifting out of poverty half the people living on less than a dollar a day.

Of the remaining 400 million who live in abject poverty, 300 million are in Africa, where the picture is not very bright. On current growth trends there is little prospect that sub-saharan Africa will meet the target of halving the proportion of people living on less than a dollar a day by 2015. In fact, the projections reveal an increase in numbers—there will be more very poor people in Africa by 2015 than there are today. Moreover, theirs will be an even higher proportion of the population than what it is today. Putting statistics aside and looking at the quality of growth, we must ask whether the family which trades poverty (with security and stability) in rural India for a marginal existence in urban India is really improving its quality of life. Even the family that stays in the countryside faces continued environmental degradation, the loss of forests they use for fuel, and the overcrowding of land as it can no longer bear the number of agricultural workers and families living off it. Even if we meet the titular or nominal goal of reducing the number of absolute poor in income terms, are we really going to qualitatively succeed in lifting them out of poverty? The global community must recognize that for the first time ever in the history of humankind, there are tools which, with the requisite political will, would allow us to meet the ambitious goals of halving global poverty. Globalization has provided the prospect of a much sharper rate of economic growth in developing countries, not just through trade integration but also through the application of new technologies and the availability of new private sector finance.

The economic means for higher growth are available. Public policy is also at work towards promoting essentially high investment in education and healthcare and encouraging the development of small- and medium-sized domestic industries in the service and productive sectors. These broad policy directions must be followed if we are to succeed. Technologies are now increasingly available – not just sophisticated, expensive western technologies, but technologies that TERI and other institutes are experimenting with across the developing world for more energy-efficient usage. While we have the policies, the possibility of growth, and the technologies to secure dramatic reductions in poverty in an environmentally and socially sustainable manner, what is conspicuous by its absence is the will to do so.

Let me now turn to what we can do to address that question of will and suggest three broad answers. The first is the global answer. The Millennium Summit[1] held at the UN in September 2000 was remarkable, because it had not just facilitated the adoption of international development targets but also put 160 world leaders together with well-prepared communiqués. The quality of private discussions at the summit was most striking. The 160 leaders broke up into round-table discussions of 40 each; in each group, the discussion veered to two issues – managing security and reducing conflict over the next century, and reducing poverty. These two seminal challenges to stability over the next hundred years were accorded equal importance by leaders, be they from Europe or Asia or Africa, from the Left or the Right, or from a developed or developing economy. It reflected a remarkable global focus and consensus on poverty reduction as an absolute dominant goal on the agenda over the next century. International organizations, institutes, and think-tanks in civil society movements must hold these leaders to their convictions. They must run global campaigns akin to those on debt relief or land mines, which constantly and tirelessly campaign to achieve their goals.

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[1] Held during 6–8 September 2000, as an integral part of the Millennium Assembly of the United Nations, the three-day summit in New York brought together 189 world leaders. It was convened to define the UN's role in the 21st century. Further details can be accessed at http://www.un.org/millennium/

My second point concerns the national level. The achievement of global goals will not come by international organizations wringing their hands and demanding more global effort on poverty reduction. The global goal must be an aggregation of national efforts. It requires a country-by-country, steady, and benchmarked progress towards poverty reduction. The UNDP's contribution is in monitoring and benchmarking. Apart from the UNDP's global human development report, its national Human Development Reports[2] have gained enormous attention in India as a means to benchmark progress made in realizing social targets of universal education, improved healthcare, etc. In India, this exercise is also carried out at the state level in around 20 states. The competitive dynamics it sets out between states is remarkable. Similar experience in Brazil reveals that when the UNDP's state report comes out, the office receives panic calls from the offices of various cities, wondering how their city benchmarked against the neighbouring city. Tremendous competition has been promoted between cities and states on progress towards social goals. The Brazilian government has now taken the 15 states with the lowest human development index and launched a national initiative to remedy this. Thus, the UNDP has managed to build constructive competition into the politics of Brazil.

At the global level too this is evident. The Human Development Report 1999 gave Ireland a low rating on literacy. For the Irish, literacy is extremely important to their claim to be the software capital of Europe—they view themselves as the Bangalore of Europe.[3] They felt threatened by the human development rating, which suggested as much as 20% adult illiteracy in Ireland. The Irish Government pumped around 2 million pounds more into adult education proving yet again that a drop in a global rating has enormous impact on countries competing in the globalized economy. They address these competitive disadvantages urgently and invest in higher social spending.

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[2] Launched in 1990, the HDR (Human Development Report) is an independent report commissioned by the UNDP and produced by a select team of leading scholars and development practitioners. It has been translated into more than a dozen languages and launched in around 130 countries annually. Each HDR focuses on a topical theme in the prevalent development debate and provides analysis and policy recommendations, which puts people back at the centre of the development process. The composite indices are the human development index, the gender-related development index, the gender empowerment measure, and the human poverty index. One day following the launch of HDR99 in Ireland, the government pledged new funds and a campaign to combat illiteracy. Brazil created a special commission on poverty, drawing heavily on HDR99 findings on national income inequalities.

[3] The capital of India's southern state of Karnataka, Bangalore, is a bustling and diverse city where ancient arts flourish alongside India's software industry. It is home to some Indian software majors, including Infosys Technologies Limited.

India can play an important role vis-à-vis its neighbours in the broadest sense of the word—the developing world. Increasingly, the UNDP's model of development cooperation is shifting to a South–South model. This is partly driven by the fact that the rate of change in developing countries has accelerated so much that it is often only fellow countries of the South that really have the relevant advice and know-how to meet the challenges of development. India can learn much more today from Brazil's experiences of decentralization than from the United States or Britain or elsewhere in Europe. Similarly, there is massive interest in the Indian software sector in many other developing countries. The rest of the developing world is anxious to catch the elusive secret of creating a Bangalore. One of the most dynamic features of development is the trade and brokerage of ideas and advice between different developing countries. India must take the lead not only within its borders but as a source of advice and expertise across the developing world. It is worth noting that India is the largest non-OECD[4] (Organisation for Economic Co-operation and Development) donor to UNDP, a fact to be proud of.

The UNDP is fighting to reduce poverty and secure a sustainable human development future for all. It is working to create a global benchmarking of progress to reap the international development targets. This is done in conjunction with its sister UN agencies and with inputs from other developmental actors, including the OECD, the World Bank, and the IMF (International Monetary Fund). We hope to drive it down to the country level with increased annual benchmarking on the progress made. The UNDP itself has drawn back from being a major grant provider and project financer, to trying to concentrate its resources on areas where it can have a real strategic impact. The challenge in India is an extreme microcosm of the challenge faced globally. Less than 0.5% of India's annual government spending comes from ODA (official development assistance), which is less than 2% of the government's development account spending. There is no way that ODA as a whole have a huge financial impact on the course of Indian development. The spending by UNDP of around $20–40 million a year is a drop in the ocean compared to the financing needs of India's development. However, the

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[4] The OECD (Organisation for Economic Co-operation and Development) brings together the governments of 30 member countries to discuss, develop, and perfect economic and social policy through experience sharing and coordinating domestic and international policies. The OECD is rich, in that OECD countries produce two-thirds of the world's goods and services, but it is not an exclusive club. Essentially, membership is limited only by a country's commitment to a market economy and a pluralistic democracy. Some members include the UK, the US, Switzerland, Japan, Australia, and Finland. India is not a member.

UNDP can contribute sizeably through ideas and advocacy—not just abstract, academic ideas but smart, applied advice around issues such as decentralization, environment and governance, as well as in post-conflict or post-disaster situations such as the current tragedy in Gujarat. This specialized set of interventions would make a difference because it rests on the very special relationship of trust that the UNDP enjoys with developing countries. The UNDP will operate in partnerships with fellow members of the UN systems; the more the UNDP narrows its role, the more it relies on partnerships with the UNICEF, the World Bank, etc. in terms of resources and sectoral work. There will also be partnerships with institutions like TERI.

Behind these partnerships will lie a sense of urgency. The means to reduce poverty are now available. To work for an organization like the UNDP at this moment in history is a particular privilege because the rate of change in the world has suddenly created this opportunity for fundamental far-reaching successes in the battle against poverty. However, the privilege will not immediately translate into opportunities and success unless we fight for it. We must also make a clear choice of where we are to go—on the road towards exclusive limited globalization with integration of the world's rich around their markets, needs, and consumer preferences or towards a globalization that brings equal benefits in the form of economic growth and security to the poor as well as to the rich.

Summary of the questions-and-answers session

Mr Mark Malloch Brown said that women are a greatly under utilized social and economic resource across the developing world. The UNDP has for the last few years championed the idea that the gender issue is at the heart of development. Services to women are the best investment, parallel to health and education. 'For a quick, high impact development effect, nothing beats addressing gender issues.' According to Mr Brown, the UNDP has been supporting women in the *panchayat* elections in India. Internationally, women are being given a fillip by the UNDP 'at the top'. He cited the example of a former Deputy Prime Minister of Jordan who is now the first woman to be appointed as the Assistant Administrator and Bureau Director for the Arab States. He concluded saying that women need to be in the most senior ranks of development agencies to enable them to be effective in their objectives.

There was a question on Africa and international development targets. Mr Brown admitted that the challenge was tough considering that even though development targets for the region are around seven per cent, there is just a three to four per cent per capita growth rate. The savings in the continent are not large enough to meet the seven per cent target. Yet, countries like Nigeria and South Africa give cause for optimism.

Keynote address 4 by

Sam Pitroda

Chairman and CEO, WorldTel Limited, UK

Poverty: the global challenge for governments, industry, scientists, and civil society 149–155

Chairperson's remarks by

Vinay Kohli, Secretary, Ministry of Information Technology, Government of India, New Delhi

India has been a country of philosophers. In fact, the inequality in our society is largely founded on our ability to rationalize our lot. When Kaun Banega Crorepati began to be aired on television we were told that it would have an adverse influence on society since it focused on an ugly attribute called greed. Those who take decisions on our behalf, who promise to eliminate poverty, design and implement schemes on our behalf and create an entire vision in which we are notionally at the centre of their attention, need to answer many questions. Does technology have the answers, will it fill the gap and empower us? The answer has to be an emphatic yes. The Internet, less than ten years old, is today helping to shrink the world. Radio and television have been with us longer, and telephones for more than a century. Clearly, what is required is to make the devices that technology has created cheaper, more accessible, and easy to operate.

A few.weeks ago I saw an intriguing report in one of our daily newspapers about the development of a 'Simputer'. The press report was followed by the entrepreneur producing a mock up of this handheld computing device in my office. Here was an ingenious device produced at rock bottom cost, capable of almost instantaneous communication using the Internet. A few weeks later a visiting team from Media Lab Boston, came with yet another device developed at the cost of 50 dollars, and capable of providing similar communication and computing capability as the 'Simputer'. A few days ago, there was a newspaper report about an American who had developed a mobile telephone which would retail for a little less than ten dollars.

Whatever may be leading to the invention of these cheap communications tools, the exciting prospect of universal empowerment that these devices create needs to be recognized. In our country, large as it is, natural calamities

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Delivered on 8 February 2001

occur from time to time, the latest being the tragic earthquake in Gujarat. The Andhra Pradesh and Orissa coasts face cyclonic conditions regularly. While the forces of nature cannot yet be controlled, and I emphasize the word *yet*, technology has certainly enabled us to anticipate oncoming disasters and inform communities of imminent danger to life and property. Managing the aftermath of each disaster is a challenge for technology developers. Satellite phones were the first communication devices used to establish links between those affected by the earthquake in Gujarat shortly after it struck. V-Sat technology was used to establish video conferencing links between the worst affected areas and the state capital. Technological solutions designed to identify areas worst affected by natural calamities and to direct relief efforts to areas that needed them most are now available. Where earlier, ham operators provided the only channel of communication, today a variety of solutions for both communications and management of relief have been created. In order to be even more effective the need is to make technology affordable and accessible. Both have to be done simultaneously and both need further technological innovations to achieve this end. Multidisciplinary groups with a capacity for understanding and assimilation are actively pursuing these goals.

When the dotcom revolution started, there was an immediate realization that technology could only take you so far. Designing appropriate software was undoubtedly a technological challenge, but the skills of a layout artist, the capability of a skilful editor, and the need to tap suitable sources of information had also to be addressed. Today, while we talk about convergence in technology, there is need to recognize that people with different specializations also need to converge, making the new tools of IT (information technology) more effective and relevant. I say this in the context of the accepted need to provide universal access to communication capability. Access is meaningless unless suitable content, meeting the needs of the people, can be provided. Clearly, technology also needs to address the building up of an information database and we need to develop technology by which such a database can be created more efficiently and kept up to date on a real time basis.

We can today, see how rapidly technology is changing and predict some of the directions in which it will go. We know, for instance, that the IT revolution will change the way in which things can be done. Doctors, bankers, governments, lawyers, accountants, will all find that the traditional way in which they delivered their services will change. Access to knowledge will be universal, questions will be more meaningful, and transparency will breed a higher degree of inquisitiveness, increasing, in turn, the extent of inclusiveness. Inclusiveness will bridge the social divide, the precursor to bridging the economic divide.

Today we have the ability to do most things in our R&D centres and institutes of excellence. We blame lack of resources for not being able to translate this capability into more meaningful and universally available solutions. With increasing access to information, people are questioning the relevance of our scientific achievements. People wish to know how problems relating to public health are being addressed. People insist on knowing how broader issues relating to their educational needs are being looked at. People want to know why technology which is advancing at the speed it is, is unable to meet the challenges of society. Why is it that in this age of technology, the supply of drinking water is diminishing rather than expanding? Why is it that access to medical assistance is not yet at the desired level, and why is it that those who are deprived of greater participation in society do not have access to the means that they perceive as being capable of taking them into the future?

These questions must have been before Dr Pitroda when he returned to India in 1983. These questions are before all of us, those in the business of developing technology, the more privileged, those with wealth and the power to take decisions on behalf of society. Are we going beyond the stage where we establish capability, to the stage of developing a working model? The need of the hour is to realize that the change that we are looking for will not happen unless we get down to bringing it about. This is the challenge, the adventure, and the task that we must embrace.

Keynote address

To talk about poverty as a global challenge for government, industry, scientists, and civil society to an audience like this is a demanding task. So much has been written and talked about on this subject that it will be difficult to consolidate some of those great ideas into something meaningful. I share with you some of my own experiences of poverty and what it means to all of us.

My example is the same as many others. My story is the same as lots of young Indians all over the world, struggling and succeeding, and then looking back at India again, trying to come to grips with what ought to be done to eliminate poverty; it hurts more than people think. When I drive around Delhi, I see little kids outside the window of my car. I do not like that scene, and feel helpless and frustrated wishing I could do more. I can always talk about IT (information technology), the digital divide, and all the subjects that I specialize in but thought I should take this time to think through with you the issue of how poverty affects each one of us personally.

I firmly believe that technology is the greatest social leveller, second only to death. Technology can put two unequal human beings or societies, on an equal footing. Today, if you are rich, well off or prosperous, you are automatically technologically advanced, but if you have not been able to master technology of all kinds, you are poor. Connected to that is education, the foundation for poverty alleviation. I think of the 450 million illiterates in India and how they feel walking on the streets in their own cities, villages, towns, unable to read what is written on the bus. How humiliated they must feel and how very little we have been able to do to eliminate illiteracy. As we move into the 21st century, India will have the world's largest population of illiterates.

Let me tell you a personal story, to show how things happen in life. I was born and raised in a tribal area of Orissa. Outside of my house was a train track, and we grew up counting train compartments everyday. This was not too long ago: I was born in 1942, of parents who had had education up to the fourth grade and whose one dream was to educate their children. There was no high school to speak of, so my father decided when I was nine to send me and my brother to study. I left home with my brother who was twelve, for Gujarat, because my parents were from there. They felt that if we did not study we would never escape poverty. We studied a little, got out of school, and then decided we must go to college because everybody else was doing that. We had no clue as to what all of this meant because at home conversations concerned survival or caste. Since I come from a carpenter's family, I was supposed to be a carpenter or blacksmith. Nobody could even think of crossing that boundary and this was the 1950s. We had a professor in college whose son used to play cards with us in Baroda. We thought his father is brilliant, and that we should do as he did. He was a professor of physics, so we decided physics was a good idea. I remember telling my father that I would like to study it. He asked me, what I meant by physics. I had a hard time explaining to him what physics meant. Anyway, I studied physics and read one day in the newspaper that President Kennedy dreamed of sending a man to the moon. I thought that was a good idea and decided to go there. As a 19 year-old, I had no clue at all as to what it meant, but it sounded interesting and lots of people were thinking about going to America.

We went to the Orissa government for a scholarship and somehow got $600 for the airfare and a scholarship. I bought a ticket, and went by boat from here to Europe, by plane from Europe to New York, and by bus from New York to Chicago. I had never even heard of Chicago or used a telephone in my life. I landed in Chicago with $40 and realized that education was the key. Nobody had told me that education would get me out of poverty, but it was interesting because all the people who wore ties and looked good were educated. You looked back and saw that all those who looked poor were not educated. I studied there and went on to get a PhD in physics. By then, I had fallen in love with someone in India, so I decided to make some money, call her, get married, and forget all about education. We came to America and got married in 1966, starting life all over in a different world.

I realized that technology had wiped out my caste completely. Now, I was in a different caste. I was no longer a carpenter; nobody knew who I was any more. I was now a technocrat, a little one, designing this and that. When I was 31, my father visited us and asked me what I did. I told him that I worked on software, and took him to our office. He could not believe that people worked here, saying that there was no factory, no equipment, everybody had a desk, paper, and pencil, and it looked as though people were reading there. He had thought his son was working in a big factory with machines and tubes. He asked me why I did not quit and start something of my own. I listened to him; quit, built and sold a company in 1979, making a little bit of money. Then all of a sudden, I realized I had left lots and lots of my cousins behind. Soon, 40 members of my family came to the US and I put everybody through college and schools, and then started looking back to India.

I came back, ran into Rajiv Gandhi, who was working on water, literacy, immunization, telecom, and had a great tenure for almost 10 years. Then I had a heart attack, quadruple bypasses, and ran out of money completely. I had two children going to college in US, and needed 150 000 dollars just to pay their tuition after tax. So, I returned and started all over again.

Once in India, you cannot get away from the idea of poverty, it hits you and remains with you the rest of your life. A great deal has been done in the last 50 years, but apparently it is not enough and a great deal more needs to be done in the next 10–20 years. We recognize that the government has a big role to play in terms of policies and programmes. These days I travel a lot. The scene in Africa is very different from the scene in India. In India, I find that people want to give something back. There are lots of talented, educated people who feel frustrated with the system. What can be done about poverty and education? The desire to do something is as great as the frustration. I am delighted that we as a group are discussing what we can do to eliminate poverty. I am delighted that the government has taken an active role as well. The Europeans and Americans achieved this very differently from the manner in which we are trying to do so. Today, the model is that of a free market economy with no cross-subsidies, with a return on investment. The contradiction is between a need for subsidies on the one hand and a shortage of money on the other. We are in a very difficult position when it comes to social goals.

There are a lot of rich people in India doing very well. Industry has done tremendously well in the last 20–30 years but, at the same time, poverty has increased. Sometimes, people say, hardwork will probably alleviate poverty but it doesn't work that way. The issue is complex and multidimensional. Technology is just one small piece, policy is another; personal initiative is another small piece, while luck may be the bigger piece. No matter how hard you try, I am convinced that not much can be accomplished until we tackle the issue of literacy. I have always said female literacy, infant mortality, and population were the biggest challenges. We do not like to talk about population in India, it is always on the backburner. But when you look at the numbers and realize that by 2050 you will have 1.5 billion people, it does give you a measure of the pressure on the system for resources, land, environment, etc. You cannot ignore population when you talk of poverty, for they go hand in hand.

Today, it is fashionable to talk about the digital divide but twenty years ago nobody had heard of it. In 1975, I wrote my first book on the digital divide, published by the Institute of Electrical and Electronics Engineers as a special issue on telecom in developing countries. Today the subject is fashionable because it means a huge market. When people look at 1 billion people in India with 30 million telephones and a global telephone density of 15 they immediately see a sea of 120 million telephones. Even within this sort of IT world, there are 2 billion people or 2.5 billion people who have never made a telephone call. The entire continent of Africa with all 50 countries put together, has a lower telephone density than Tokyo or the city of New York. We have been struggling to increase telephone density in Africa. Four years ago in Johannesburg, a friend of mine, Jai Naidu (who was the Minister of Communications at the time) and I worked out a complete programme for 50 million telephones in Africa. Everybody championed it, loved it, but nothing has happened. Absolutely nothing. Jai is no longer a minister, and the whole dream faded. Telecommunication brings about openness, accessibility, connectivity, networking, democratization, decentralization, and, as a result, social transformation. Technology is a tool to open the system.

In India, I had the opportunity to work in the government and I realized how obsolete our systems were. On the one hand, we produce software for the best of the best in the world and on the other, cannot change our own filing systems. When I was Chairman, Telecom Commission, I had 63 files delivered to me on the first day. I refused to read them because if I did, I would not be able to do anything else. After about a week, I got a call from the Prime Minister's office asking me about this. I replied that it was my asset. Ignorance is a great asset, because if I had read those files, I would be thinking in exactly the same way as everybody else. As I said earlier, we have great software talent, but will not get out of the filing system. We had 7000 square feet of prime office space in the heart of Delhi where files were stored. Some of these files had not been looked at for 5 years but there was no change in mindset. Poverty is also a cultural mindset. If you make up your mind to get out of it, it is possible to do so, but the fundamental tool is education.

I end by saying again that technology is a great social leveller, a great tool for modernization as well as for meeting basic needs, water, literacy, health, housing, shelter, etc. More and more technology is needed to provide faster and cheaper communication tools and to expedite the process of development. It is necessary to have a dialogue with the real stakeholders. Whenever I am asked to speak on telecom with my colleagues in telecom, I tell them that we are talking to ourselves. We do not need to do that—the need is to talk to others, who are out there, and don't have the opportunity to listen. That is a tougher task. It is a bigger challenge. Many of our colleagues here have done these kinds of things. I admire their initiative and that of TERI in bringing all of us together.

Summary of the questions-and-answers session

Dr Sam Pitroda began the question and answer session by saying that there was no one in the world who liked poverty. Lack of education, he pointed out, was one of the main reasons for poverty. However, talking about education was easy; it was difficult when one had to make a living by working 18 hours a day.

Technology, according to Dr Pitroda, is a human being's ability to do something outside of ourselves to make life more comfortable. He affirmed that the human being was at the centre of all technology, though some abuse technology.

Dr Pitroda did not agree with a participant who believed that the media had failed to spread the message of education amongst the poor. Dr Pitroda felt that the media had succeeded in creating aspirations. Now, all we needed to do was create the right kind of aspirations. He also expressed dissatisfaction at the fact that as a society Indians were not paying much attention to literacy.

Dr Pitroda felt that there was a great deal of traditional knowledge in many areas, but we had unfortunately not been able to capitalize on it. The problem was that when we thought of technology, we automatically assumed it to be 'urban, elite, foreign, exotic, fancy, sexy, and not problem solving.'

Keynote address 5 by

Tsutomu Makino

President, New Energy and Industrial Technology Development Organization,
Tokyo, Japan

Poverty: the global challenge for governments, industry, scientists, and civil society 157–165

Chairperson's remarks by
Suresh P Prabhu, Hon'ble Minister for Power, Government of India, New Delhi

Poverty is the root cause of environmental degradation. The eradication of poverty can take place only if development takes place. So while the eradication of poverty is a concern, conserving the environment should be one as well. Therefore, it is a challenge before the government, technologists, scientists, civil society, and everybody else to eradicate poverty and ensure at the same time that subsequent development is really sustainable. Technology is going to play a very important role in this.

There is no one way by which poverty can be measured. But one certainly does not measure it in terms of access to drinking water, clean air, or land that is free from environmental degradation. These are not normally considered as wealth in the conventional sense of poverty evaluation. In reality, though, this is really the wealth a human being possesses as his natural right. (So in the quest of removing poverty what he actually loses is something which is more precious than the assets that he acquires as a measurement of removal of poverty.) Therefore, the real challenge is how to retain both, making sure that environmental degradation does not endanger or derail our quest for the removal of poverty. Technology should be affordable, accessible to the common man, and sustainable at the same time, using renewable sources of energy. Greenhouse gas emissions are causing serious concern as they threaten the globe, changing its climates and leading to fears that a rise in sea levels will threaten the existence of humanity. And yet, even as greenhouse gas emissions grow, large parts of the world still lack sufficient energy, power, and electricity to survive. To provide them with these, appropriate and affordable technologies, that are easy to operate and renewable, are needed, taking into account the natural resources of that area. Currently, the

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Delivered on 8 February 2001

Indian government has prepared plans to generate 100 000 MW of electricity within the next 12 years. Energies and technologies conventionally known to us are probably not the best but there is no other choice. World technologies face the challenge of transforming social life in ways that might eradicate poverty.

Keynote address

Importance of technology in addressing modern-day problems

Importance of technology

As the general theme of the DSDS indicates, the fight against poverty in developing nations assumes a high priority today. Developed nations also have their problems. They must attend to ageing societies. They must enhance their industrial competitiveness in the wake of rising globalization and the increasing importance of information technology in economics. Both developed and developing nations need to overcome environmental problems and energy security issues.

Technology development is, and will be, the most critical instrument in resolving all these problems. That is one reason why the communiqué from last year's Okinawa G-8 Summit stated the importance of research and development for achieving sustainable development and solving future problems.

To explain the importance of technology, I will summarize the history of the relationship between the economy and industrial technology in post-war Japan with three examples.

The first is miniaturization and weight-reduction technologies, which have been driving the economic expansion of Japan. Sony Corporation, a Japanese audio-visual giant, was the first to successfully mass-manufacture transistor radios, making the best use of miniaturization technology by replacing traditional vacuum tubes with transistors. More recently, semiconductor manufacturing technology provided us with portable phones weighing only several tens of grams, much less than the weight of the first car phone that appeared in 1979—weighing more than 10 kg, it was hardly portable. Since the telephone was first introduced into Japan in 1900, many technologies, including increased packing density and lower power consumption of semiconductors, lithium-ion batteries, digital communication technology, and liquid crystal technology, have contributed to delivering today's lightweight cell phones.

In Japan today, cell phones outnumber conventional phones. Every second Japanese has a cell phone, a necessity of modern life. In May 2001, a new generation of cell phones with a worldwide format will appear on the market.

A time will soon come when cell phones will be effective anywhere on the earth, in addition to the Internet and electronic mail services now available. In this way, advances in technology have drastically transformed our lifestyles with regard to communication.

The second is an equally important example of energy-conservation technologies. Since experiencing the two oil crises in the 1970s, Japanese industry has been striving to conserve energy. Taking the unit energy consumption during the first oil crisis in 1973 as a baseline index of 100, in 1998 it was only 61 for the manufacturing industry, 80 for the steel industry and 57 for the papermaking industry (IEE and ECC 2001). This is because of energy-efficient utilization of waste heat and process streamlining. As a result, Japan has become one of the most energy-efficient industrialized nations.

Third, environment-friendly technologies are also important. In addition to global motorization, Japanese automakers have been leading with technologies in this regard. For example, in 1972, the CVCC (compound vortex controlled combustion) engine that Honda Motor Company Ltd developed just nine years after its entry into the auto market was the first to pass the United States Clean Air Act. This act, generally known as the Muskie Act, required the reduction of new automobile emissions to one-tenth of those of older vehicles. The CVCC technology adopts a combustion technology which uses a sub-combustion chamber. Subsequently, Japanese automakers have cleared various environmental standards that regulate the emission of NO_x (nitrogen oxides), SO_x (sulphur oxides) and PM (particulate matter) by introducing catalyst technology with three-way catalysts, and lean-burn combustion technology, including electronic fuel injection systems. In 1997, Toyota Motor Corporation commercialized the world's first fuel-efficient, environment-friendly hybrid-car, which combines an engine and a motor.

Japanese automakers are highly likely to provide vehicles even friendlier to the environment, such as fuel cell vehicles, now known as 'next-generation vehicles.'

Necessary conditions for technology development

Let me describe how Japanese policies on industrial technologies have influenced Japanese industry.

Industrial policies before the 1990s

Industrial and social infrastructures in an environment where market principles can work well are essential to technology development, as are human, material, and financial resources. Post-war economic expansion in Japan can be attributed partly to the nation's aggressive approach to technology introduction as well as to the resultant 'self-supporting manufacturing technology development.' Social and cultural infrastructures have been crucial in this achievement. High levels of education, hardworking people, cooperative relationships between management and labour, constructive management strategies with longer viewpoints and so forth, have been very effective.

Significant have been the visions of the Japanese government in response to the needs of the times and politics. These visions have induced vitality into the private sector and the input of human and financial resources. By sharing information with the private sector and guiding private activities, the government suggests the desired orientation and combination of technologies. In this way, the Japanese government is only responsible for the initiation of research and development.

The private sector, along with active domestic markets and global competition, is pivotal in technology development in Japan. In 1999, research expenditure in Japan was 3.12% of the GDP (gross domestic product), one of the highest of developed nations (with the US at 2.63%; Germany at 2.37%; and France at 2.17%), while the government's share of expenditure was 21.9% (the lowest compared with 29.3% in the US, 33.9% in Germany and 38.7% in France) (Cabinet Office of Japan 2001).

In addition, research results in Japan have been commercialized more than those in other nations. 85.9% of research in Japan was brought to the market in 1999. Compare this with 83.7% in the US during the same year, 78.8% in Germany in 1993 and 78% in France in 1996 (Ministry of Public Management, Home Affairs, Posts and Telecommunications of Japan 2000). This is brought about by the aggressive research efforts of the private sector to meet social and cost-cutting needs.

I have often heard people say, 'While the Japanese undervalue basic research, they are good at imitating technologies pioneered in other nations.' On the other hand, there is an excellent multiplier-effect between the commercially oriented private sector and the government's policies, which has resulted in outstanding economic progress.

I would like to briefly focus on the semiconductor industry, a typical high-tech industry illustrating policies at that time on industrial technologies.

The Japanese government's industrial policies in the 1960s and beyond helped the semiconductor industry to expand rapidly in the 1980s. The VLSI Research Association was established in 1976. It has greatly contributed to technological advances through collaborative researches between the industry, academia, and the government. By introducing relevant technologies from other industries, including optical lens and numerical control machinery expertise, the semiconductor industry established the 'micromachining technology' of metal-oxide semiconductors. In 1986, the total volume of shipped Japanese semiconductors, topped the US for the first time. In 1987, the US government established an institute for research towards the next generation of semiconductors called SEMATECH (a consortium of semiconductor manufacturers), reportedly following the Japanese government's approach to industrial technologies.

Industrial policies in the 1990s

In the 1980s, Japan's technological competitiveness was so enhanced that some countries regarded Japan's technology as a threat to their industries. Japan itself had absolute confidence in its technologies and targeting policies.

However, the bursting of the 'bubble economy' in the late 1980s and early 1990s exhausted Japan's economy, depriving its industries of vitality. An insecure feeling has replaced Japan's confidence in its technologies. According to the World Economic Forum, Japan's ranking in terms of economic competitiveness dropped from first in 1990 to twenty first in 2000.

In the 1990s, Japan was urgently required to reform its technology development system. Besides the turbulent changes starting from the unification of East and West Germany in 1990, and the end of the cold war with the collapse of the USSR in 1991, it was also necessary for Japan to deal with changes in the business environment, including borderless economic activities and information technologies that were revolutionary in nature.

The Japanese are becoming increasingly aware that they must select the strategy of exploring technology frontiers instead of the traditional strategy of catching up with other nations. Japan acknowledges that it should adopt a new targeting policy where reinforcing technological competitiveness is a 'national target.' There are two goals in this policy. The first is establishing a legal framework that promotes technological competition in the private sector with the objective of expanding markets. The second is emphasizing future critical issues, including the information age, ageing societies, environmental protection, resources and energy.

To be more specific, first, Japan must make its framework of human resources more flexible by removing rigid research systems in academia and out-of-pocket research approaches in industry. Second, Japan must promote standardization that covers global markets and the strategic utilization of intellectual property. Third, Japan must adopt strategic investment systems for research and development based on technical trends and cost effectiveness. Accordingly, Japan should urgently provide the necessary conditions for reinforcing its industrial competitiveness by combining its human, financial, and technical resources.

Consequently, starting from 1997, the Japanese government relaxed restrictions on national university personnel, allowing them to serve in the private sector, and established the legal infrastructure to let academic research results be more easily commercialized. Last year, systems were established where research results commissioned by the government would belong to the researchers themselves in order to stimulate research and facilitate the commercialization of the fruits. In addition, state-supported research and development systems and engineer training systems were initiated as comprehensive measures to enhance industrial technologies.

In April 2000, the Japanese government launched a vital NITS (national industrial technology strategy). Last month, the Council for Science and Technology Policy was reorganized with broader powers and placed under the direct authority of Prime Minister Mori. The council is responsible for industrial technology policies covering government-supported research, and has laid down its next generation Science and Technology Basic Plan reflecting the NITS. The plan calls for a total investment of 24 trillion yen over the next five years and demands, for the first time, one per cent of GDP as government investment in research and development. In the past, this ratio was as low as 0.6% of GDP.

The next-generation Science and Technology Basic Plan has four key goals.

- Strategically allocating resources to promising research, including life sciences, information and communication, environmental protection, and nanotechnology and materials.
- Introducing the principle of competition into the allocation of financial resources among research fields.
- Restructuring research and development systems by encouraging human resource flexibility and improving evaluation systems.
- Reforming collaboration among industry, academia, and government by, for example, establishing collaborative organizations for each research area.

The role of the New Energy and Industrial Technology Development Organization

I would now like to give you a brief history of our organization, NEDO (New Energy and Industrial Technology Development Organization) and describe how NEDO has been contributing to the development of technology in Japan.

Post-war Japan's energy policy promoted the use of convenient energy sources as a necessity of the industrial infrastructure. Coal was replaced by a stable supply of oil as the primary energy source and nationwide electrification was promoted. The experience of the two oil crises resulted in changes in energy policy. To reduce dependence on crude oil, especially that from the Middle East, Japan concluded that it must diversify its energy sources. While the government has been eager to develop nuclear energy as a clean and stable energy source, it also established research and development plans for new energy in 1974, known as the Sunshine Project, and energy saving in 1978, known as the Moonlight Project. These efforts have contributed to long term research and improved technological competitiveness.

NEDO was established by the government in 1980 with the objective of researching and developing new energy technologies based on public and private financial, human, and technical resources. At that time, NEDO began the development of various technologies, including photovoltaic power generation systems and advanced coal utilization technologies. Projects on energy-saving technologies began in 1993, with the aim of commercializing innovative and energy-efficient technologies.

Since 1988, NEDO has been positioned as the core implementation agency for industrial technology policies. It consolidates nearly all the development studies of industrial technologies initiated by the Japanese government. In 1990, NEDO started conducting global environment-friendly projects. Since then, we have also developed environment-friendly manufacturing technologies.

Recently NEDO set four key goals for speedily addressing nationwide technology renovation.

- Strengthening our strategic functions and laying emphasis on promising research and development.
- Allocating more financial resources to competitive research and development and acting as a bridge between industry and academia.
- Being more active in supporting the commercialization of study results.
- Improving our evaluation capability to make research and development more effective.

In this way, NEDO will be enhanced as the core research and development agency of industrial and energy-related technologies by making the best use of our budget of approximately 300 billion yen.

The importance of international technological exchanges for technology development

NEDO promotes numerous international exchanges. Personnel, information, and technology exchanges provide essential conditions for technical development. Japan is active in international exchanges with both developed and developing nations through personnel exchange and technology transfer.

NEDO emphasizes fostering human resources, technologies and ideas, industries and businesses, as well as technology transfer.

- To foster human resources, NEDO has invited about 2 500 foreign researchers to Japanese institutes, and has dispatched several dozen Japanese researchers overseas.

- To foster technologies and ideas in international research environments, NEDO conducts research promotion projects that financially support innovative international joint research. These projects have subsidized more than 600 researchers worldwide involved mainly in basic research. Some of the research results have been commercialized, while some of the researchers have been awarded international prizes, including the Nobel Prize.
- To foster industries and businesses, NEDO has conducted projects to promote the commercialization of international joint research since last year. Companies from Europe, the US, China, and Russia participate in this project. NEDO expects more international participation in the future.
- To foster technology transfer, NEDO conducts model projects to introduce developing countries to proven energy saving and alternative fuel technologies that lead to more effective energy-use in energy intensive industries. It is our hope that, by learning from these model projects, these countries will adopt the technologies, thereby leading to greater dissemination of energy-efficient technologies.

The DSDS provides NEDO the opportunity to encourage India-Japan bilateral technology exchanges. Currently, in India, NEDO is conducting feasibility studies on transferring energy-efficient technologies to various energy intensive industries, including steel, cement, and fertilizer.

Technology will provide the solution to the key issues of environmental preservation and efficient energy use that India now faces.

I am certain that NEDO will contribute to resolving these issues through the development and transfer of new energy technologies, energy saving technologies, and environment-friendly technologies.

I would like to express my sincere appreciation to the Governing Council for the opportunity to speak on such a momentous occasion.

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Summary of the questions-and-answers session

This session attracted a number of questions, but because of time, only a few were entertained.

A participant pointed out that the Japanese model, unlike those of many industrialized countries, was based on cooperation and on consensus. He wondered how developing countries could learn more about the Japanese model. Mr Tsutomu Makino admitted that this was a very interesting albeit difficult question. Sustainable development, he explained, was more than mere technology: it was an amalgam of society, culture, and human relationships. It was culture that was responsible for the high economic growth rate in Japan. Japan, he said, was very happy to cooperate with countries that wanted to adopt many of its practices without creating any impositions.

The World Energy Council has declared that nuclear energy is environment-friendly, while many find this to be far from the truth. A participant wanted Mr Makino to shed light on this contradiction. Mr Makino said that disposal of nuclear waste caused a great deal of environmental degradation. The speaker said that NEDO was developing new sources of energy (both solar and wind), but for the next three to four decades, it would not be possible for any new source of energy to replace atomic power generation.

The next question pertained to the attitude of the Japanese government towards small- and medium-scale industries. Mr Makino said in Japan, the small- and medium-scale industries contributed a great deal towards the GDP (gross domestic product). The government, on its part, took into account the energy requirements of such industries. It had also come up with a lot of programmes to enhance their growth. Besides, they were the beneficiaries of many subsidies.

Another participant wanted to know the work done by Japan in the field of ocean energy. To this, the speaker replied that research on ocean energy was not a viable proposition. Basic research was being carried out but was not practical. All research should be directly beneficial to the common man which, as the speaker said, was not the case with ocean energy. It was a very high-cost source of energy and thus did not have a very bright future.

The last question of the session was generic in content, pertaining to the bubble economy in Japan. Mr Makino said that for the Japanese economy, a number of things had gone wrong, but he attributed its downfall to two major factors. The first, he said, was the poor management of the Japanese economy in the 1990s. In the new age of globalization, the Japanese economy had not been able to integrate itself to the developing trends. Also responsible were the negative aspects of the Japanese culture. Just as the positive aspects of the Japanese culture led to its elevation, the negative aspects wove a contradictory story.

Keynote address 6 by

Paul J Crutzen

Division of Atmospheric Chemistry, Max-Planck-Institut für Chemie, Mainz,
Germany and Center for Atmospheric Sciences and Scripps Institution of
Oceanography, University of California, San Diego, USA

Poverty: the global challenge for governments, industry, scientists, and civil society 167–171

Chairperson's remarks by

A Ramachandran, Chairman, TERI, India

It is a great honour for me to present Prof. Paul Crutzen, Nobel laureate, a very distinguished scientist, and it is difficult for me to introduce him to an audience who already knows him so well. Prof. Crutzen's main scientific interest lies in the role of atmospheric chemistry in climate and biogeochemical cycles. He was first trained as a civil engineer, and worked on building and bridge construction. He joined the Department of Meteorology (Stockholm University) as a computer programmer, did his master's degree and later his doctorate and DSc. With such a distinguished career, he has been a visiting professor to many institutes around the world and particularly in Germany. He also has honorary degrees from several universities around the world.

For the last 50 years, CFCs (chlorofluorocarbons) were used widely as refrigerants, solvents, cleaning agents, halogens for fire fighting, etc. It was only later that this substance caused considerable problems for the ozone layer. Prof. Crutzen and his group made this known through their earlier work on acid rain during the UN conference at Stockholm in 1972. Later, he shifted his interest to atmospheric chemistry and has done tremendous work to show the effect on climate change and how it will affect all of us in the decades to come if we do not take adequate action. The Montreal Protocol is fortunately one of the success stories of the UN because it has been implemented both by developed and developing countries and the CFCs are being phased out gradually. I think they will be completely phased out by 2005. In the last two days, the effects of global warming on climate change were discussed. It is now more or less accepted by the scientific community around the world that we have to tackle this problem. Arguments are difficult, but

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Delivered on 9 February 2001

ultimately the international community will accept the recommendations being made by the Intergovernmental Panel on Climate Change so that the harmful effects of global warming and climate change can be mitigated.

Keynote address

Effects of industrial and agricultural practices in developing nations on atmospheric chemistry and climate

The enormous growth of human activities is clearly discernible in the rising concentrations of many radiatively and chemically important gases and particles that have occurred since pre-industrial times. This is due to direct increases in the emissions of CO_2 (carbon dioxide), CO (carbon monoxide), CH_4 (methane), NO_x (nitrogen oxides), and halogen-containing industrial organic gases, in particular the CFCs, and indirectly through chemical transformations, which affect, for instance, the concentrations of ozone and particulate matter. These changes exert a substantial influence on climate and the chemical composition of the atmosphere, affecting human health and the biosphere.

The growth of human activities has accelerated over the past two to three centuries, bringing it on a par with or, in some cases, strongly surpassing geological and biological processes. For this reason, Eugene Stoermer and I propose to assign a new geological epoch, the 'anthropocene', to the past two to three centuries and future centuries. The 'anthropocene' is proposed as a new geological epoch to mark the strong, and in many cases dominating human impact on the earth's ecology and geology. It is proposed to cover the recent 200 years of the 'holocene', the geological epoch of the past 10 000–12 000 years since the last glacial. The proposal to introduce the 'anthropocene' is based on the following arguments.

The expansion of mankind, both in number and per capita exploitation of earth's resources, has been astounding. During the past three centuries, human population increased tenfold to 6000 million, accompanied by a growth in cattle population to 1400 million. Urbanization has increased tenfold in the past century. In a few generations, mankind is exhausting the fossil fuels that were generated over several hundred million years by the biosphere. The release of SO_2 into the atmosphere by coal and oil burning, globally about 160 Tg/year, is at least twice the sum of all natural emissions together. Human action has transformed 30%–50% of the land surface. More artificial nitrogen is now applied as fertilizers in agriculture than fixed naturally in all terrestrial ecosystems. The escape of NO into the atmosphere from fossil fuel and biomass combustion is larger than the natural input, giving rise to photochemical ozone ('smog') formation in extensive regions of the world. More than a half of all accessible fresh water is used by mankind. Human activity has increased the species extinction rate 1000- to 10 000-fold in the tropical rain forests. Several climatically important greenhouse gases have substantially increased in the atmosphere: CO_2 by more than 30% and CH_4 by more than 100%. Furthermore, mankind releases many toxic substances to the environment, and some, the CFC gases, which are not toxic at all, but which nevertheless caused the Antarctic 'ozone hole' and which would have destroyed much of the ozone layer if no international regulatory measures to end their production had been taken. Coastal wetlands are also affected by humans, resulting in the loss of 50% of the world's mangroves. Fishing removes more than 25% of the primary production of the oceans in the upwelling regions and 35% in the temperate continental shelf regions. Because of the anthropogenic emissions of CO_2, global average surface temperatures are estimated to increase by 1 °C–5 °C by the end of this century. Sea level rise may become a major problem over the current millennium.

To assign a more specific date to the onset of the 'anthropocene' is somewhat arbitrary, but we propose the latter part of the 18th century, because since then the global effects of human activities have become noticeable, through data retrieved from glacial ice cores which show the beginning of a growth in the atmospheric concentrations of several greenhouse gases, in particular CO_2 and CH_4. Such a starting date also coincides with James Watt's steam engine design of 1784.

The precipitous loss of ozone (O_3) in the lower stratosphere at heights between 12 and 22 km during the late winter/spring period over Antarctica (the so-called 'ozone hole'), first reported in 1985, has been the most dramatic example of a human-caused change in the global atmospheric chemistry system. It occurred unexpectedly in a chemically sensitive region of the atmosphere, the one farthest away from the industrial nations in the northern hemisphere, which are responsible for the bulk of the emissions of the CFCs. The loss of ozone, which was not predicted, causes a substantial increase in the penetration of biologically harmful, solar UV (ultraviolet) radiation to the earth's surface. On a positive note, although rather late, international agreements have been reached to curtail the production of CFC gases, which took full effect in 1996 in the industrialized nations. This measure has prevented the occurrence of catastrophic ozone depletions. Due to the very slow breakdown of CFC gases in the atmosphere, it will, however, may be optimistically, take until the middle of this century before the ozone hole disappears.

Although about 90% of all atmospheric ozone is located in the stratosphere (the 10–50 km altitude region) and only 10% in the troposphere below, tropospheric ozone is of great importance for the chemical composition of the earth's atmosphere because of its role in the production of hydroxyl (OH) radicals, which occurs through a set of chemical reactions, that involve absorption of UV radiation with wavelengths shorter than about 350 nm by ozone, yielding oxygen atoms with enough energy to react with water vapour to produce OH. Despite very low concentrations of only 4 OH per 10^{14} air molecules as a global average, its great reactivity makes OH the main oxidizing agent in the troposphere; this ultra-minor gas is thus often called the 'detergent' of the atmosphere. Without this cleansing action, most gases that are produced by the biosphere and by humans would accumulate to much higher concentrations in the atmosphere. The average removal times of almost all natural and anthropogenic trace gases in the atmosphere are determined by their reactivity towards OH. Because of maximum levels of UV radiation and water vapour, OH concentrations too maximize in the tropics, which thus serves as the 'laundry place of the atmosphere'. Due to increases in the levels of UV radiation resulting from stratospheric ozone loss and growth in the anthropogenic emissions of NO_x ($NO_x = NO + NO_2$), CH_4, and CO by fossil fuel and subtropical and tropical biomass burning, significant changes in the future levels of OH concentrations are expected, although they cannot yet be well quantified.

Ozone in the troposphere has also been strongly affected by human activities. Increased industrial and agricultural emissions of NO_x, CO, and CH_4 have led to growing ozone concentrations, as observed at a number of European sites with long measurement records. The increase in ozone can affect human health as well as agricultural and plant productivity. Furthermore, as ozone is also a greenhouse gas, the observed changes in ozone can influence earth's climate.

So far, the greatest impacts on the chemical composition of the atmosphere and climate have been caused by fossil fuel burning and industrial activities in the developed world. However, with growing populations and industrial/agricultural activities in the developing world, the largest changes in the chemistry of the atmosphere in this century are expected to take place in the tropics and subtropics. Contrary to common belief, large-scale air pollution is not only created by the industry but also by biomass burning (vegetation fires), which mainly takes place in the tropics and subtropics. The effects are clearly discernible, even from space. During the INDOEX (Indian Ocean Experiment) measurement campaign that was carried out during the dry, winter monsoon season of 1999, heavy air pollution, especially marked by high levels of strongly sunlight absorbing aerosol particles, emanating from South and South-East Asia, was observed over large tracts of the northern Indian Ocean, reaching all the way to the intertropical convergence zone (the meteorological equator), where the particles are largely removed by rain.

The absorption and scattering of solar radiation is so strong that about 10% of the otherwise available solar radiation does not reach the Indian Ocean waters. These observations of heavy unusual air pollution, containing 10%–15% soot particles, far from the source came as a surprise. They show that the chemistry and radiation balance of the tropical atmosphere are already strongly affected by human activity, probably with more to follow . To prevent strongly worsening local to regional conditions, it is important that regulatory measures are taken in the developing countries to reduce air pollution.

The tropics and subtropics are regions of the atmosphere about which we have the least knowledge. For the above-discussed reasons, it follows that it is particularly important that much stronger research efforts be devoted to atmospheric physics and chemistry research in the tropics and subtropics. What is most needed is to build up a strong research base in these parts of the world. Although such a goal does not produce immediate economic gains, over the longer term the active involvement of talented scientists from developing countries in atmospheric and climate research will be of critical importance to sustain our environment.

Summary of the questions-and-answers session

Prof. Paul Crutzen said that most of the effects on global climate were not due to the poor and underdeveloped countries, but what was being done in the industrial world. The underdeveloped countries, though, in a bid to catch up with the developed nations do contribute their bit to greenhouse gases.

Prof. Crutzen hoped that in the near future, the enormous emissions of soot particles in the atmosphere would be counteracted by India. That would not only have a positive impact on the climate but also improve health in the cities and rural areas.

He said that there had been many proposals to heal the ozone layer but they were all impractical and even scientifically ridiculous. Even if they could work in theory, the costs would be enormous, and the side effects very unpredictable. More than 50 years would be needed to get rid of the ozone hole. The amount of chlorofluorocarbons in the atmosphere was declining but that was not the case with bromine, which had a greater capacity to destroy the ozone.

In response to a query, Prof. Crutzen said that every year there was an increase in pollution levels due to the 5000 million tonnes of carbon burnt every year. He said that afforestation could counter increasing carbon dioxide. However, afforestation had to be efficient and long-term in nature. Also, it must happen in those areas that are rich in natural nutrients so as to save costs.

Keynote address 7 by

Karan Singh

President, The People's Commission on Environment and Development India, New Delhi, India

Poverty: the global challenge for governments, industry, scientists, and civil society 173–181

Chairperson's opening remarks

Farooq Sobhan, Former Foreign Secretary and Ambassador of Bangladesh, Bangladesh

Dr Karan Singh is a man of great distinction and of many parts—a politician, a scholar, a poet, and indeed one of the great thinkers of this age. He will deliberate on a certain aspect of sustainable development but it is clear from the Summit's deliberations that the nature of sustainable development is all encompassing. A discussion on sustainable development now essentially addresses the central question of the quality of life, not only of individuals but of the global community—yet another dimension of globalization today. Sustainable development is critical in particular for South Asia, which today has the maximum concentration of poverty. There is a clear correlation between the fact that this region houses the poorest of the poor and that it faces the maximum degree of environmental problems. The region's population problem is also of a very high magnitude. A combination of these factors, along with the dual lack of literacy and infrastructure, makes South Asia a central challenge to this age.

Bangladesh is currently experiencing an environmental nightmare. The pollution of air, water, and other natural resources has reached critical proportions. To quote an example, the fastest growing city in the world today is Dhaka, the capital of Bangladesh. With a population well in excess of 10 million and projected to reach 25 million within 25 years, the provision of housing and infrastructure presents a Herculean prospect. Dhaka has already outpaced Delhi by becoming one of the most polluted cities in the world; indeed, the situation is worsening by the day.

The issues of sustainable development must be addressed against this backdrop and central to this whole exercise is the issue of governance—not simply governance in the context of nations or regions but in the context of the globe. It is also a fact that while at one level the world exists as a single village, at another level, society is experiencing greater divisions than ever before in the quality of life as well as in the nature of governance itself.

Delivered on 9 February 2001

Keynote address

Culture and sustainable development

As we enter the third millennium, hurtling on the irreversible arrow of time, humanity is facing both tremendous challenges as well as tremendous opportunities. Science and technology have opened up undreamt of vistas for growth and development. Extra-galactic cosmologies, space travel, unravelling of the human genome, instant communications – all sorts of wonders and marvels – have been presented to humankind by science and technology, thus transforming life on this planet. On the other hand, there are dangerous negative aspects like horrendous ecological degradation, environmental destruction, widespread poverty and malnutrition (particularly in the developing world), global pandemics, crime, terrorism, etc. It is an exciting and unique situation. There are two roads opening up before us. One leads through sustainable development to a sane, harmonious, and peaceful global society. The other road is that of unsustainable disasters, which if continued upon will lead to very grave crises in the century that has just opened. The situation is reminiscent of a marvellous poem by Robert Frost called *The road not taken* (1916).

Two roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth;

Then took the other, as just as fair,
And having perhaps the better claim,
Because it was grassy and wanted wear;
Though as for that, the passing there
Had worn them really about the same,

And both that morning equally lay
In leaves no step had trodden black.
Oh, I kept the first for another day!
Yet knowing how way leads on to way,
I doubted if I should ever come back.

I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I-
I took the one less travelled by,
And that has made all the difference.

The question at hand is which road we are going to take as thinking, feeling, and compassionate human beings. A fundamental question, involves moral choices, ethical decisions, technological innovations, and scientific breakthroughs. TERI must be congratulated for having organized this impressive summit on sustainable development, a critical concept if humanity is to safely transit this century.

The People's Commission on Environment and Development, which I represent, is an NGO that holds public hearings around the country to elicit the views of the people to counter the fact that too much of India's environmental policy is formulated without reference to the people that it really affects. The commission attempts to elicit the views of the common people, who really bear the brunt of environmental destruction. In the 20th century, with its tremendous breakthroughs, the destruction of the environment too has been incalculable—the deforestation, the desertification, the nuclear warfare, the slaughter of millions and millions of people in battle, the depletion of ozone layer, global warming, etc. Humankind is now beginning to repay its *karmic* debt[1] to Mother Earth for having misused her so cruelly. Far from getting away with the unbridled use of non-renewable resources, humans have succeeded in polluting almost all the elements that surround them. The water is polluted—the Ganga, the most sacred river for millions of people, supposedly purifying has itself become polluted. The oceans, the very foundations of life, are polluted. Even the air we breathe is polluted. The soil has been polluted by the increasing use of pesticides. The sheer noise of modern civilization, the constant clanging and clamour of modern life has polluted even sound. Every one of the fundamental and primeval elements—ultimately the basis of sustainable development–has been corrupted.

All the religions of the world are deeply involved in sustainability. In 1986, at a meeting in the Cathedral of St Francis of Assisi[2], five religions proposed their declarations on man and nature. Despite their theological and philosophical differences, each of their declarations holds immense reverence for this planet and life on it.

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[1] Basic to Eastern philosophy, especially Hinduism, is *karma*, the law of cause and effect. *Karma* comprises the good and bad deeds that an individual accumulates in a lifetime. A *karmic* debt that must be 'paid off' through cyclical rebirths, and when it is paid off, one attains *nirvana*, the highest spiritual plane. Details at <http://www.comparativereligion.com/reincarnation.html> last accessed on 8 December 2001

[2] In September 1986, to mark its 25th anniversary, the WWF (World Wide Fund for Nature) launched the Network on Conservation and Religion with an interfaith gathering in the Cathedral of St Francis in Assisi, Italy. Assisi was chosen as it was the birthplace of St Francis, the patron saint of ecology. Religious leaders representing Buddhism, Christianity, Hinduism, Jews and Islam deliberated with environmental leaders on how conservation and religious organizations could work together to combine ethical and moral values with conservation imperatives to improve life on earth. Each of the five religions represented there issued a declaration on nature.

India's oldest texts, and probably the world's oldest living religious texts, are the Vedas[3] that date to many thousands of years before the birth of Christ. The Vedic civilization was born essentially in the forests on the banks of rivers and lakes. Environmental values, as a result, were woven into the very texture of Vedic hymns as the seers were overcome with tremendous feelings of awe and ecstasy as they contemplated the splendours of nature. The Vedas are replete with beautiful hymns to the sun, the oceans, the forests, the trees, etc. I would like to draw attention to one text in particular. The Bhoomi Sooktam, the hymn to the earth in the Atharva Veda,[4] comprises 63 verses and contains, as far as I am aware, the most eloquent and complete statement of environmental values to be found in any religious texts. The closing stanzas of this great hymn can be summarized as follows.

Whatever I dig from the earth, may that have quick growth again.
O! purifier, may we not injure thy vitals or thy heart.
May this earth with people who speak various tongues and those who
have various religious rights according to their places of abode pour
for me treasure in a thousand streams, like a constant cow that never fails.
May those born of the earth be for our welfare, free from sickness and waste.
Wakeful through our long lives, we shall become bearers of tribute to thee.
Earth, my mother, set me securely with bliss in full accord with heaven.
O! wise one, uphold me in grace and splendour.

The deep feeling that the ancient seers had for the divinity inherent in nature and in its creation is explicit in these lines. The Vedic view did not hold man to be a species endowed with sovereignty over the earth and the right to exploit it at will. On the contrary, many ancient traditions, particularly in India, had the concept of sacred pools, forests, and groves, not supposed to be touched by any human being but left entirely in their pristine glory. Animals and birds are also held in high regard. For instance, in Hindu tradition, each deity or each aspect of the divine is linked with an animal like the elephant, tiger, or the bull. The reverence shown to the cow can be seen as a function of the awareness of its ecological importance. Birds like the swan, the parrot, and the peacock were also considered sacred. The basic insight of many ancient religious traditions was that humans live in a sacred environment that has to be sustainable for them to flourish. Unfortunately, with the growth of population and accompanying modernization and industrialization, most such practices fell by the wayside. Now, however, we are coming full circle. We are realizing that unless we recapture this concept of divinity inherent in the natural environment, that unless we recapture the commitment to sustain the environment, we will end up destroying it. We have to turn to the sun again for energy. And in the 21st century, it is in renewable sources of energy that the salvation of the human race lies. Technological breakthroughs are imperative for this. So much energy is available—solar brilliance, windswept expanses, hydroelectric tides, and so on. These renewable sources of energy must be tapped increasingly as the world moves into the future. Simply banking upon non-renewable sources, which will soon run out, may leave us powerless and precariously positioned.

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[3] The Vedas are the primary scriptures of Hinduism containing hymns and incantations, ritualistic teachings, and theological and philosophical writings from ancient India. Along with the *Book of the Dead*, the *I Ching*, and the *Avesta*, they are the oldest extant religious texts. Besides their spiritual value, they give a unique glimpse into everyday life in India 4000 years ago. Also the most ancient extensive texts in an Indo-European language, they are invaluable to the study of comparative linguistics. Of the four Vedas – Rig Veda, Sama Veda, Yajur Veda, and Atharva Veda – the Rig Veda is the oldest, composed around 1500 BC and written in 600 BC. Details at <http://www.sacred-texts.com/hin/> and <http://www.hindunet.org/vedas/index.htm> both last accessed on 8 December 2001

[4] The latest and fourth Veda is a collection of magical spells and incantations for healing wounds; treating diseases like leprosy, jaundice, dropsy, and others; inducing successful childbirth; fostering romance; enhancing virility; etc. It is divided into 20 books, having a total of 730 *suktams* (hymns) comprising 5987 *mantras* (verses). Most *mantras* are metrical; about 80 hymns are in prose. There is about twenty per cent overlap between the Rig Veda and the Atharva Veda (about 1200 mantras. Details at <http://www.vedah.com/avs/avintro.htm> last accessed on 8 December 2001

This must be complemented by a massive educational campaign to inform the people on the importance of what Prof. Ilya Prigogine[5] somewhere calls a 'new naturalism'. The awareness of the importance of the environment, energy, and their conservation must be created.

There is a great deal of energy wasted even in developing countries. We cannot really afford to waste energy and must begin by educating students and, finally, adults to ensure that they do not waste energy.

Population is also a very important factor. In 1900, the population of planet earth was 1.71 billion and in 2000, it is over six billion. This exponential increase in the growth of population will ultimately lead to environmental disaster. What are we going to do about it? The first United Nations Conference on the Human Environment (Stockholm, 1972) was attended by only two heads of State—Mrs Indira Gandhi of India and Mr Olof Palme of Sweden. Oddly enough, both were subsequently assassinated. Twenty years later in 1992 at Rio, despite the presence of 118 heads of state, developments in the light and wake of the summit have been disappointingly weak. Developed countries have not fulfilled the commitments they made at Rio. At the Rio + 5 review, there was no evidence of a substantial decrease in the tremendously wasteful energy expenditure in developed countries and in the way in which the natural resources of earth continue to be plundered. Today, developing countries are seeking to raise living standards, which will inevitably result in an increased utilization of scarce resources while developed countries are not cutting back as they had promised to at Rio. Between these two factors, we find ourselves in a rather powerless situation. We must have an entirely new philosophy of life to successfully meet this challenge. It is indeed a philosophical challenge, a conceptual challenge. Merely incremental progress will not suffice. We must develop a frame of thought that stresses holism in place of hedonism, cooperation in place of competition, convergence in place of conflict, and an interface movement in place of fundamentalism. Unless we inculcate this new naturalism, unless we move away from the exploitative nature of our transactions with the earth, unless we recapture the ancient insights of the importance of living in harmony with the elements, our future is going to be very dim.

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[5] Prof. Ilya Prigogine was awarded the Nobel Prize in chemistry in 1977 for his contributions to non-equilibrium thermodynamics, particularly the theory of dissipative structures. Born in Moscow in 1917, he graduated from Universite Libre de Bruxelles and is the Ashbel Smith Professor of Physics and Chemical Engineering at the University of Texas at Austin (USA), where he founded the Ilya Prigogine Center for Studies in Statistical Mechanics and Complex Systems. Striving for a better understanding of the role of time in physical sciences and biology, he has contributed significantly to the comprehension of irreversible processes. His work on dissipative structures has stimulated many scientists and may have profound consequences for the understanding of biological systems.

It seems to me, as I travel around the world now, that new vistas of hope are opening up. Young people around the world are growing increasingly committed to environmental protection. It was the green movement in Europe and in the United States that led the modern commitment to conservation. The younger generation must be increasingly involved because it has greater vested interests in the future than we do. We have made our contributions, negative or positive such as they are, to the present situation. The young who are going to be citizens of the 21st century, must realize that to continue in our ways can only be disastrous.

The key to sustainable development lies in both classroom education and media awareness. For those of us living in these oases of luxury in the midst of vast oceans of poverty and deprivation, the situation may perhaps not appear that desperate. However, for those who have to walk 10 kilometres every day to get drinking water, the need is urgent. Children in the developing world are born with stunted minds and twisted bodies because we are not able to give them the nutrition necessary for a decent existence. Who will pay back this *karmic* debt? We may have to begin to pay the debt for our misuse of the earth, but who will pay for the deprivation imposed upon the younger generation and upon generations yet unborn. This is the question we must ask ourselves because we all bear the responsibility.

Clearly, not only governments, but multinational corporations too must respond. This is captured by the theme of this Summit—*Poverty: the global challenge for governments, industry, scientists, and civil society*. All four elements have distinct roles to play. Governments must become much more receptive. Unfortunately, animals and plants cannot vote—perhaps that is why politicians are not always particularly sensitive to what happens to them! However, civil society must raise its voice. Political parties must approach the people with their concepts of sustainable development. Such concepts must be brought into the mainstream of contemporary thinking.

Industrial development is desirable but not at the cost of total pollution of our atmosphere. Industries must develop environment-friendly, low-pollution technologies. Scientists are the key to any such breakthrough. Civil society is an important stakeholder and involves all of us—non-governmental organizations, educational organizations, and women's institutions.

I would like to make a special plea here. The experience of the People's Commission on Environment and Development shows that the viewpoint of women is very different from that of men with regard to environment. They bear the real burden of environmental deprivation, deforestation, and unplanned population growth. The girl child is still a neglected factor in our social system.

I would like to conclude on a doubly meaningful note. First, we must work together in order to achieve sustainable development. No single effort can achieve it. It has to be a massive cooperative endeavour. We must cut across barriers of race, religion, caste, geography, and nationality and realize that the world is a single family—*Vasudhaiva kutumbakam*.

The second element is the empowerment of the feminine, without which the world is really in danger of getting into a serious, perhaps terminal, situation in the course of the next century. The feminine has to be re-endowed with a stature equalling her greatness. In Hindu mythology, the goddess Mahalakshmi is not only the goddess of material wealth but also of the graciousness of human spirit, which is the true wealth of civilization. The goddess is shown seated upon a huge white lotus. It is said that a lotus is born in the muck, mire, and darkness of the underworld but emerges clear and glistening, much as human consciousness has emerged from the slime of primeval evolution and come up to where we are today. The goddess is dressed in spotless white—the symbol of her higher consciousness. Her eyes are like lotus petals—the most beautiful shape for a woman's eyes in Indian iconography. She is full-breasted and deep-navelled, the world mother. She is Gaia[6] in the Western tradition, and Bhavani Bhara, Bhavani Vasundhara in the Indian tradition. She is bathed on either side by six-tusked elephants.

One of the most beautiful photographs ever is of planet earth taken from outer space. It shows our planet as it really is—a tiny speck of light and life against the unending vastness of outer space. So beautiful and yet so fragile. And upon that beautiful blue globe, superimpose the image of this great goddess, seated on her lotus, the plant life coming out from the ocean, bathed by elephants, blessing us. This vision is the best keynote that I could give you.

Chairperson's concluding remarks

I shall try to distil the central thoughts of Dr Karan Singh's presentation. He spoke about the two roads of Robert Frost. To me, one was leading us in the direction of the future. His mention of one world points pertinently towards South Asia, which is really at the heart and soul of the debate on sustainable development and poverty. South Asia must get its act together and face the challenge of overcoming poverty.

The deliberations during the past two days have included references to some success stories of South Asia, and indeed, Bangladesh prides itself on having one of the most successful NGO (non-governmental organization) movements anywhere in the world. Many of these NGOs have a tangible environmental dimension. Others such as the Grameen Bank have done remarkable work in the area of microcredit and rural education. Nearly eight million women are self-employed in the rural areas as a result of different microcredit programmes. Urban centres have two million women working in the government sector alone.

Dr Karan Singh has correctly emphasized the importance of the empowerment of women, which is central to the future of the South Asian region. It has been the experience of Bangladesh that the moment a woman is employed and experiences her own sense of independence, she creates a new dimension of social responsibility. The population growth rate in Bangladesh has been reduced from 2.8% to 1.6%—one of the most successful population programmes anywhere in the world. The key to this success has been female employment and independence.

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[6] Gaia or Gaia Theory, as it is sometimes known, was first expounded by Dr James Lovelock, a specialist in atmospheric sciences, in his 1979 book *Gaia: A New Look at Life on Earth*. The essence of Gaia is that life on earth functions as a single super-organism and that mechanisms exist to promote life by maintaining a balance favourable to living things. This could include maintaining constant proportions of gases in the atmosphere. Lovelock's book was written in a non-scientific style and suggested that Gaia ('she') had sentient characteristics. The name, Gaia, was taken from the Greek goddess who drew the living world forth from Chaos. Details at <http://www.magna.com.au/~prfbrown/gaia_jim.html> and <http://www.ecolo.org/lovelock/> last accessed on 8 December 2001.

Let me also attempt to expand Dr Karan Singh's explanation to encompass the kind of world we live in. The quest for a new paradigm must not simply superimpose on us a global agenda that ignores the basic principles of equity, justice, and fairplay. The single most important issue of the 21st century, which will certainly dominate the debate on sustainable development in the years to come, is the free movement of people. If goods, services, and indeed our air waves can be free, why can people not move freely? The central paradox of our times is that in the debate on globalization, we have freed certain aspects of our society and our lives, but the movement of people outside national frontiers, particularly in the case of those moving from developing to developed countries, has become extremely restricted. If this debate on sustainable development is to acquire credibility and meaning, we must put on centre-stage the issue of the freedom of movement of people. It is inconceivable that while we compartmentalize the world into areas where there are vast open spaces for a handful of people, others must be obliged and compelled to co-exist in conditions of abject misery and poverty. This cannot make sense.

I would like to conclude by quoting from a speech Dr Karan Singh made in August 1998, on *Science, religion, and ethics in the 21st century*. 'The ecology of planet earth has to be preserved from mindless destruction and ruthless exploitation, and enriched for the welfare of the generation yet unborn. There should be a more equitable consumption pattern based on limits to growth and not on unbridled consumption.'

Luncheon address by

Wakako Hironaka

Member, House of Councillors and former Minister for Environment, Tokyo, Japan

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Chairperson's remarks by

Joachim Treusch, Chairman, Forschungszentrum Jülich, Germany

According to a press release a few months ago, the first three of an expected 200 village schools aimed at providing knowledge and opportunities to Kampuchea's rural children will be officially opened on 4 November 2001 in three remote villages in Kampuchea. Each of the five rural schools, named after its donor, is equipped with two solar panels that provide enough energy to operate a computer for 4–5 hours a day. Village children will be taught to use computers to provide them with skills that might help villagers to benefit from services and knowledge available in more popular areas. This is also aimed at establishing telemedical services and at making it possible for village children to connect by e-mail with other children around the world. An amount is also set aside for teachers to motivate them to teach in villages. A local Kampuchean non-governmental organization Women for Prosperity, will recruit teachers to help organize training workshops for them. The donors of the first three schools are Japanese parliamentarians, Dr Wakako Hironaka, former Minister of Environment, Professor Nicolas Nicopend from the Massachusetts Institute of Technology, and the Tokyo Shindoshind Rotary Club.

According to the Intergovernmental Panel on Climate Change report, as a result of global warming, it is estimated that at the end of the 21st century, temperatures will, on an average, increase by 2 °C and the sea level rise by 50 cm. Regardless of this striking forecast, many people still think this as a predicament that will affect generations ahead. Some influential politicians from developed countries have expressed doubts about the harmful effects of global warming, citing a lack of sufficient scientific evidence, thus delaying the promotion of an environmental policy in the countries. To raise public awareness on the urgency of this issue, awareness education is very essential.

Delivered on 8 February 2001

Luncheon address

A balance for mankind in his environment

I would like to take this opportunity to express my deep sympathy to the victims of the devastating earthquake that took place in the state of Gujarat last week. When Kobe was hit by a similar disaster in 1995, 6400 lives were lost and over 100 000 homes were destroyed. Even with the support of many people both in Japan and abroad, it took years for the city to resume functioning again. On an individual level, the psychological imprints of the event remain even today, a testimony to the fact that the scars of such a tragedy are not easily erased from the human mind. The earthquake in Gujarat further showed just how vulnerable humans are in the face of nature's strength. It highlighted again just how important it is for our living patterns to be in harmony with the environment in which we live.

Thinking about these disasters and other such environmental catastrophes, I come to realize that the quality of a human's life is largely determined by how appropriate his or her style of living is in relation to the surroundings. The environment is a complex issue, and environmental destruction, which ultimately causes great pain to human life as well, is a result of many interlinked factors. Poverty, population increase, conflicts and wars, and rapid economic growth in the absence of proper regulatory measures all impact on the quality of the environment. Therefore, I think that it is timely and appropriate that TERI decided to focus this year's Delhi Sustainable Development Summit on 'poverty' and various related issues in order to look for ways and means to tackle the problem.

The deterioration of the environment impacts heavily on poor regions and poor people. It places further stress on already destitute conditions, causing greater and greater hardship amongst those who are least equipped to over come it. Those who aim to escape poverty through ill-managed use of surrounding resources, in turn, put even greater pressure on the environment. A vicious circle of destruction and damage is thus created. It is essential that this cycle of environmental destruction and poverty be broken. A positive relationship between the environment and development must be nurtured.

Since the Rio Summit, 'sustainable development' has been the keyword in achieving an environmentally sound world. Many positive steps have been taken globally by individuals, national governments, international organizations, and NGOs (non-governmental organizations), to promote this concept. However, reality shows that overall environmental degradation is continuing to worsen.

How can this happen, when so many people have been working so hard over the last 10 years to overcome the pressing issue of environmental deterioration? The answer is painfully simple. Put plainly, the speed of environmental degradation is far greater than our efforts to prevent it.

Though many discussions have taken place on national and international levels, there have been only a few success stories. Lack of coordination, absence of a good governance structure, and conflict of interests among various actors have prevented concrete action. It has been proposed by the Ministry of Environment of Japan that an Asia-Pacific Eminent Persons Forum on Environment and Development be established to address such problems. This forum would aim to present, to public policy makers and other persons of influence throughout the world, a new model for development that would lead to greater equality and sustainability. The year 2020 will be set as a target year for dealing with those issues commonly shared in the Asia-Pacific region that are likely to become increasing threats. Such issues include urban environmental pollution, conservation of tropical forests, rising sea levels, marine pollution, fresh water shortage, and food supply.

The relationship between poverty and the environment must also be investigated. Related to the problems of poverty, we must also consider the question of wealth. The desire for material wealth and the ways the developed nations have gone about acquiring it have, more than anything, brought about the deterioration of the global environment. If developing countries were to follow a similar path, the environmental impact would be disastrous. With this in mind, the concept of 'wealth' in the 21st century must be redefined such that it can be jointly achieved by both developed and developing countries. This process of clarification will show us that quality of life involves more than just money. It depends very much on the cleanliness of the air we breathe, the water we drink, and the food we eat. It depends on the amount of space we have and the abundance of nature around us. Basing future human activity on such a philosophy would embody the principles upon which truly sustainable lifestyles should be based.

The Asia-Pacific region houses 60% of the world population. It is home to various economic, cultural, and natural systems. From a global point of view, it is important to build more equal and sustainable societies in this region, and to overcome the division that exists in the policies between different national, regional, and cultural groups.

It is only through working on this problem together that a solution to our common problems will be realized. I strongly hope that all the participants gathered here today will kindly offer their creative inputs to this Forum and that together we will take one step further in realizing our goal of finding a balance for mankind in his environment.

Luncheon address by

Gilbert Parent

Ambassador for Environment, Foreign Affairs and International Trade, Canada

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Chairperson's remarks

S Sundar, Distinguished Fellow, TERI, New Delhi, India

Mr Gilbert Parent is now Canada's Ambassador for the Environment. India and TERI have both had a very close and cordial relationship with Canada and its institutions. We have been actively supported by CIDA (Canadian International Development Agency), and on the academic front there have been very close interactions between TERI and institutions in Canada. The fact that Canada has an Ambassador for the Environment shows that it recognizes – as every country should – that environmental security is not a construct that any one community or country can assure for itself or by itself. It depends on millions of actions and interactions between different areas of jurisdictions over which no single authority has control. Environmental forces transcend borders and oceans and impact on the lives of people living thousands of miles apart. Large amounts of greenhouse gases in the North can disrupt weather patterns, causing a rise in sea level and the inundation of coastal populations in the South. Truly, these forces are now global–wherever we are, no matter where we live, no matter who we are, they cloud our horizon, endanger our health and security. It is in respect to these issues of climate change that one expects that concerns will unite the North and South. But the spirit of cooperation that emerged in Rio seems to be disintegrating, if the polarization that took place in Seattle is any indication. Unfortunately, in this world issues such as power, geopolitics, and poverty are divisive, and cannot be solved by an agenda based only on a narrow interpretation or on narrowly conceived sustainable development. As Mr Chidambaram argued last night, sustainable development, and environmental security can become realities only if they are developed within a larger framework of poverty amelioration and meeting the basic needs of human beings. This is the crux of this summit and perhaps the area where there is an urgent need for close North–South cooperation.

Delivered on 9 February 2001

Luncheon address

The appointment of an ambassador for the environment is not new thing for Canada; there have been two ambassadors since 1989. These appointments reflect the importance that the Government of Canada attaches to the environment and sustainable development. As Canadians, we are stewards of a vast country rich in natural resources and varied ecosystems, and we work hard in ensuring sustainability in the management and use of these resources as well as meeting our conservation goals. We also take an active role in seeking international solutions to environmental problems, which are global in nature. My role as Ambassador for the Environment is to represent Canada at international meetings and to interact with colleagues and experts in the fields of environment and sustainable development. For example, I will be involved in the preparations for the World Summit on Sustainable Development, Rio + 10 in 2002. Canada hopes that Rio + 10 will be a catalyst to address outstanding challenges and will charter a course for the future. We hope to avoid too strong a negative emphasis on a retrospective assessment of *Agenda 21*. From our point of view, the agenda for Rio + 10 should reflect current and emerging sustainable development issues and provide sufficient scope to accommodate the results of the review of *Agenda 21* from the tenth session of the Commission on Sustainable Development. One of my other duties will be to talk to Canadians about what Canada is doing both domestically and internationally to address sustainable development issues.

The paper, *Our Common Future*, states, 'in order for development to be sustainable it must meet the needs of the present without compromising the ability of future generations to meet their own needs'. Now this provides a clear statement of the ultimate goal of sustainable development. However, as it does not prescribe a particular path to achieve this ultimate goal, it is fair to say that the term 'sustainable development' itself has come to mean different things to different people. Canada is committed to integrating sustainable development into its domestic and foreign policy. We recognize that there is a difference in emphasis between developed and developing countries about the concept. The Canadian view is that sustainable development is an adaptable framework, which can be modified in response to changing conditions and increasing knowledge. It does require, however, that we integrate economic, environmental, social, and cultural factors into the policy-making and decision-making process. It requires coordination and cooperation not only within government departments but also consultations and the involvement of the private sector and civil society.

In a recent example, our minister for international trade released last week the Canadian framework for conducting environmental assessments of trade negotiations. On releasing this document, he said 'assessing the environmental implications of our trade negotiations delivers on an important commitment we have made to Canadians, taking environmental considerations into account in this matter strengthens Canada's trade policy. Canadians can be assured that we are taking appropriate actions to promote balanced and sustainable development'. The glue for our trade relations and foreign relations is going to be the impact on the environment. In preparing this framework, the Canadian government was consulted extensively; we published a draft of the framework, and invited comments from interested Canadians, government officials, held meetings across Canada with our citizens and stakeholders, the summary of the comments received were published on our website, and we believe that we now have the plan that will help ensure that our trade and environmental policies continue to be mutually supportive.

We realize that for many developing countries, poverty reduction is one of the key objectives of their sustainable development strategies, which is why Canada's foreign policy statement provides a clear mandate for Canadian official development assistance. The document says, 'the purpose of Canada's official development assistance is to support sustainable development in developing countries in order to reduce poverty, and to contribute to a more secure, equitable, and prosperous world'. We recognize the vital link between poverty reduction and sustainable development, and have designed a broad array of programmes and policies to achieve the goal of a sustained decrease in the number of poor and a decrease in the extent of their deprivation. Virtually all our programmes are assessed with respect to their impact on the poor. At CIDA, poverty profiles and reductions strategies are integrated in country and regional policy frameworks. Even now we are formulating a new policy together with the Government of India to continue our bilateral partnership. One of our strategies is to address the root causes and structural factors of poverty. This will place an emphasis on the human and productive capabilities of the poor and on removing barriers to their participation in society. We plan to use a multi-level attack on poverty in the following ways.

First, to devise poverty programmes where the poor are the specified target group, such as destitute women and landless people. The second strategy is to have poverty-focused activities, and this refers to programmes and activities that benefit the poor but do not involve working directly with them, such as capacity building with organizations who do work with the poor. Third, we want to promote equitable growth-oriented policies and reorient public expenditure towards the social priorities. Fourth, we believe that sound economic management openness to domestic and international trade, as well as investments and private sector development investment in infrastructure services and in social sectors will help to meet the basic needs of the poor. Education, primary healthcare, nutrition, family planning, water, sanitation, and shelter will play the key roles in poverty reduction. The fifth point is food security, as this allows people to protect and sustain their broader livelihood. Sixth, we propose to promote participatory approaches that involve the building of networks through governments and other means. Development assistance, however, is only one factor among many others. Poverty reduction, global security, equity, environmental protection, and prosperity are complementary goals. I know that change is difficult and slow, and there is a lot that we do not understand but our mandate – not only the Canadian mandate but our mandate together – is clear. We must continue to use all of the resources available to each of us to fight poverty and to continue on the path of sustainable development.

Dinner address by

Antonio V del Rosario

President, Energy Development and Utilization Foundation, Inc., The Philippines

Poverty: the global challenge for governments, industry, scientists, and civil society 191–193

Chairperson's remarks by

S L Rao, Former Chairman, Central Electricity Regulatory Commission, New Delhi, India

The question of poverty, in the context of eliminating or reducing poverty while ensuring sustainable development, has brought in issues of environment and ecology which were not part of the old definitions of poverty. One issue that the subject of the conference does not mention, but which is very much in the back of our minds in India, is how to eliminate poverty and realize sustainable development within a democratic framework. Democracy is very much part of the whole discussion because in our part of the world in Asia, there have been frequent examples of countries that are said to have progressed because they have had authoritarian systems. And whether authoritarianism is what is needed in the early stages of development or whether there should be democracy from the outset is a contentious issue. One of the problems that I hope will be raised is the difficulties that governments experience in our countries in their ability to deliver. They start with ambitious social policies and great programmes, but then deliver a fraction in relation to the amount of money budgeted for them. How can we ensure that in societies like ours, plans are not merely made but are actually delivered? The role of NGOs (non-governmental organizations) is important—both in the Philippines and India.

Mr del Rosario is President of the Energy Development and Utilization Foundation, an NGO promoting sustainable energy development, utilization, management, and conservation. He is also the President of the Petroleum Association of the Philippines, an organization of companies engaged in Philippines oil exploration. But even more interestingly, Mr del Rosario is the first person from a developing country to be elected President of the World Energy Council, which is the world's largest non-governmental forum on

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Delivered on 7 February 2001

energy. He has held some very high executive positions in the past. His experience in the energy sector spans 24 years in the private sector and 34 years in the public sector in the Philippines. He was Deputy Minister for Energy Development in 1981, and is therefore very experienced in policy-making. During his tenure in the PNOC (Philippines National Oil Company); Energy Development Corporation from 1971 to 1987, PNOC's geothermal project achieved international significance and helped the Philippines to earn a place second only to the United States in geothermal energy development.

Dinner address

As the Chairman-elect for 2002–04 of the WEC (World Energy Council), I believe it would be appropriate to focus my remarks this evening on the work of the WEC and the relation of this work to sustainable development. For those of you who do not know much about the WEC, it is a global organization of member-committees from almost 100 countries. It is a worldwide organization committed to promote the sustainable supply and use of energy for the benefit of all. Its members come from many sectors—government, business, NGOs, and academe. From the work of its studies and programmes committees and its world congresses and regional fora, it offers informed opinion on energy issues to government and business. Since its member-committees include a broad cross-section of society in their respective countries, including those who have a hand in shaping energy policies, it can also provide a venue for the exchange of views and learning from one another to build consensus.

The work of WEC includes multi-year, multi-country studies for energy and related issues. For example, there is the recently completed 'World Energy Assessment' undertaken jointly by the WEC, the United Nations Development Programme, and the United Nations Department of Economic and Social Affairs entitled *Energy and the Challenge of Sustainability*. The study analyses multi-dimensional challenges arising from the supply and use of energy and our options for sustainability.

In an earlier but related work, the WEC also undertook a study on 'The Challenge of Rural Energy Poverty in Developing Countries'. The study focused on the problem of providing energy to the world's rural population, some 2 billion of whom have no access to commercial energy, and the need to reduce if not eliminate rural energy poverty.

In a call for action to address the challenges identified in the foregoing studies, the WEC has released its study entitled *Energy for Tomorrow's World - Acting Now!* The study proposes a 10-point action plan for the three energy goals of its millennium statement—*accessibility*, energy *availability*, and energy *acceptability*.

Accessibility has to do with providing reliable and affordable energy services; *availability* deals with both quality and reliability of delivered energy; and *acceptability* addresses environmentally goals and public attitudes.

From developing countries' point of view, *affordability* is a most important objective because we would like to see affordable prices of energy for our poor. The challenge is to be able to sell energy at a price that the poorest among us can afford and yet recognize the full cost of energy. Each country will have its own priorities and each will have to judge where this balance lies. But whichever path is followed, we would like to see transparency, a level playing field in the setting and realize every opportunity to reach out a helping hand to those who have the least in life. I believe that through the work of WEC and others in the field of energy, we can work together to make this a better world in the area of energy.

Dinner address by

P Chidambaram

Former Finance Minister, Government of India, New Delhi

Poverty: the global challenge for governments, industry, scientists, and civil society 195–202

Chaiperson's remarks by
Arun Jaitley, Minister of Law, Justice & Company Affairs, Government of India, New Delhi

Over the last few years, we have experienced that growth in economy, industry, and protection of the environment is probably what we need the most. At times there are very heavy costs involved in maintaining the environment, but if we do not maintain it, we will have to pay dearly. In this part of the world we have already started paying a very heavy price for it. There are thousands dying every year, lakhs and millions suffering every year on account of air- and water-borne diseases; most of our major cities don't measure up to the world's standards on the environmental index, and in some places we are way beyond the World Health Organization's acceptable norms. The young have been suffering more from chest-related diseases in the last decade than ever before. Population excesses, inequalities, inequities, and poverty are some of the causes. Industry has been mainly responsible in manufacturing vehicles that do not meet standards. Added to this, the kind of civic sense that ought to have been created over the years has also been lacking. I recollect that in the mid-1990s, even when we had completed legislating our laws, we were formulating regulations, laying down tighter environmental standards, and had legislations in place for environmental protection, water, and air pollution standards. We found that those who were charged with the responsibility of maintaining them did not really measure up. It was noticed in the mid-1990s for the first time, that the bulk of our sewage that went into the Yamuna in Delhi was not being treated.

Many opinions have been expressed in relation to activism by courts, but one area where it is really welcome, and where the Supreme Court took more initiative than the executive initiatives themselves, was that of environmental protection. The Supreme Court started it, and the high courts in several parts

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Delivered on 8 February 2001

of the country began to enforce it, and authorities were created for environmental protection by legislation after judicial mandates. Authorities who lay down standards should create a stipulated timeframe, and those who have to maintain these standards need to be disciplined. One area where we have probably lagged behind is that of good ecological governance. In fact, in many parts of the country good ecological governance has still not become popular.

In a recent meeting of lawyers held in Agra relating to the setting up of a tax tribunal in the city, almost every speech was directed against orders, particularly of the courts, which had laid down very strict standards for protection of the historical city and its monuments. The orders appeared to be very unpopular within the city because it was felt that industrial life and the economy were being destroyed by passing them despite the fact that the city and its monuments were known the world over. Similar sentiments have been expressed in Delhi and other parts of the country even though the need to keep rivers clean, treat sewage, reduce air pollution is recognized.

In Gujarat, the dye industry had polluted the underground water, but the enforcement of orders and their implementation was not agreeable. The media often raises these issues but the enforcement of strict standards leads to popular uprisings both of a section of the industry and a section of the political forces, putting the interest of the working classes in the forefront. Our challenge, therefore, is not proper legislative machinery but its implementation. It is essential to create an awareness amongst our people. Today this awareness exists amongst a limited section of people, but it must cut across to various sections of society, making good ecological governance and clever politics in India. I have not come across very serious debates on the issue of environmental protection in the Parliament; more concern is expressed when some of the difficult decisions are implemented. We have laid down important internationally accepted principles for protecting the environment. Standards must be strictly enforced and it should be made clear that the polluter has to pay. Some well-meaning activist groups resist any form of development in the name of the environment. Well-meaning environmental groups must carry on this campaign in such a manner that it does not lead to any setbacks to the entire environmental movement.

Reception address by

Björn Stigson, President, World Business Council for Sustainable Development, Switzerland

The organization that I represent started in 1991 as an input into the Rio Conference by way of a book called *Changing Course*. The founding and spiritual father of our organziation is Maurice Strong. Business needed to change course and, in the ten years that have passed since the Rio summit, business has really changed a lot. There has been a very strong shift from only a few years ago when environmentally sustainable development was seen by business as a problem and risk factor, to a situation today where it is seen as an opportunity and a source of competitive advantage. There is also a shift in business assets; business assets used to be hard assets, involving access to land, raw materials, etc. Now, in a transparent world, we can see new business assets being created. Pollution reduction by emissions trading and the ability to have a meaningful dialogue with stakeholders are assets beginning to have a very fundamental impact on the market capitalization of companies.

There is a shift towards the third pillar of sustainable development – the social pillar – and corporate social responsibility. In the future, business has to address two agendas concerning sustainable development. One is the political agenda, which is driven by forces outside business, and the other is the business agenda, dealing with business rationale, for companies to do these things.

On the political agenda the first issue is globalization with a human face. There has been unprecedented economic growth during the 1990s, but this growth has not been shared equally among nations or within them. This has led to a questioning of open global markets. Many diverse interests have found something that they can unite against, against big international institutions and against big corporations. This is a problem because the open global markets that have fuelled economic growth are being questioned, and as Kofi Annan said in Davos two years ago, there is a need for a compact between different forces, between the UN and the business community, to try to create more stable societies that can underpin the open global markets, otherwise we will see a backlash.

Another item on the political agenda is to make markets work. In Rio in 1992, there was much discussion on sustainable production and consumption. Business knows how to tackle production issues, the question is of getting things done. As regards issues of consumption, it is going to be difficult to see who will make the trade-offs. This issue is going to be much debated, leading up to the World Summit in 2002. The questions are, how can we steer the market in a sustainable direction, what the values are that we do not take into account today, and how we can make the markets work for those not within the market economy i.e. for the many poor of the world. The third issue on the political agenda can be termed growing transparency and accountability. We live today in a very transparent world; transactional corporations have to operate under that notion. This growing accountability also means that companies will have to report on their performance in another way. The World Business Council has decided that its members will have to report on their environmental performance within three years, and will have to strive towards broadening such sustainability reporting, because it is very important for the credibility of business. Business in the future will have to accept third-party verification of this type of reporting.

Another element on the global agenda is what I call the carbon-constrained world or the question of climate change. We cannot endlessly increase the concentration of carbon in the atmosphere—either the ecosystem will react or we will have to get our act together. Business and government have to accept that carbon emissions are no longer free. We have entered a new era where carbon emissions will carry a cost, irrespective of whether the Kyoto Protocol is ratified or not. The Kyoto Protocol requires cooperation between the developing and the industrialized countries via mechanisms such as the clean development mechanism, or else the targets will not be achieved. If climate change is for real, then the Kyoto Protocol is only the first step in a much longer journey.

The last item on the political agenda is the role of innovation and technology. Quite often one hears that technology is the reason for all environmental problems. People don't see technology as a solution, but as a problem on many occasions. We in business cannot assume the right to market a product that we develop. We will in the future have to argue our case on much broader issues than just scientific terms to prove why a product is good for society.

The other agenda is the business case for sustainable development. One cannot manage companies based on philanthropy but on business arguments, and must be able to demonstrate that sustainable development is good business. We have been working on the concept of eco-efficiency for a long time and have many examples from industrialized and developing countries of how environmental performance and financial performance can be combined. Reduced pollution means reduced costs, and in turn improved financial performance. It is clear from financial markets through indices such as the Dow Jones Sustainability Index that companies focusing on sustainable development outperform those which do not.

Research by Michael Porter and Jeffrey Sacks of Harvard University shows that the same forces that drive competitiveness for a nation also drive environmental performance. Michael Porter recently said that any developing country with low environmental standards is doomed to poverty. Knowledge of new products and application of new knowledge to old products, are both shrinking the physical size of products, making them more efficient. There is the service economy, which reduces the use of resources, and a network economy where you no longer own all of your assets, but cooperate with others to a higher degree.

Another point on the sustainable development business agenda are the sector member projects. Companies today find that they cannot address these issues on their own. Currently, we have five big projects – for industry sectors, forestry, mining, cement, and mobility and electric utilities – that are trying to address these issues along the value chain, together with the stakeholders, in a very open and transparent way. There has been a paradigm shift in the way business does business, also involving working outside companies.

In the last ten years, much action has been taken within businesses to alter their performance. This is happening both in the industrialized world and in developing countries. We would like to see the business community in developing countries, especially India, more active on these issues. As compared to many other big developing countries, we find that the Indian business community has been less active internationally on these issues. I challenge India to be more active in our circles and join forces with us because I think this is a question of good business sense, as also of future competitiveness not only for your own business but also for your country. We are now working towards our plans for the Rio + 10 conference in the light of such a desire for business action within the parameters of sustainable development.

Dinner address

My views on poverty and sustainable development have moved in a particular direction over the last few years. In the very beginning, nations were concerned about growth. When USA and many nations in Europe commenced their march towards economic prosperity, they were driven by this concern for growth. At that time, India was a colony, and no one here was concerned about growth. In fact, in the first half of the twentieth century, India's per capita income declined under British rule. It was only after independence, and even then during the first thirty years after independence, India's per capita registered a positive growth of about 1%–1.5%. So, when the rich and prosperous nations of the world forged ahead – committed to growth and growth alone – India did not have that chance, nor did many countries which were colonies have that chance. In fact, no country in South Asia had that chance. In the next stage, the concern for growth became a broader concern for development. Growth alone was no longer a valid proposition and the concern was for development, implying that growth must be accompanied by equity. There must be income distribution, reduction in disparities, and growth must be shared.

In the last 20–25 years, we have moved into another stage of concern—one not simply for development or development with equity but sustainable development. The concern for development not only focused on the present but also on the future. No generation has the right to rob a future generation of natural resources. We must develop at a pace and we must have a kind of development that ensures to succeeding generations the natural resources with which this world has been blessed. It must also ensure the right to be born in, grow, and live in a world less polluted and degraded. But some very thoughtful economists have recently pointed out that even sustainable development is not enough, we must take it a stage further, and the concern must be for human development, of which economic development is only a part. Life expectancy, health indices, fertility ratios, infant mortality are indices of human development: therefore, development cannot be measured only in terms of GDP growth rates or per capita incomes.

I have traced this history of our concern for growth and development only to show that over the years new and fresh ideas have influenced our thinking. Why are poor countries today more polluted and more environmentally degraded than the developed ones? Why is Asia perhaps the most polluted and most environmentally degraded continent in the world today? The facts are well known: water pollution and suspended solids in Asia are four times the world average and 20 times the OECD average. As regards air pollution, ambient particulates in Asia are 2–10 times higher than the world average and twice the average of industrialized countries. Where solid waste management is concerned, only 20% of the population in Asia has access to solid waste management services. Asia's forest cover is shrinking at the rate of 1% a year.

Asia cannot continue to live with these levels of water or air pollution. But first we must consider why Asia is so polluted and environmentally degraded. A major factor is population whose growth rate has necessarily led to a considerable degree of pollution and environmental degradation.

The second factor is poverty, the greatest polluter. Poor people with no skills, jobs, or property are in a race to capture the resources available at large. Because they do not have access to electricity, they cut wood for heating and lighting. Because they are not given protected water, they exploit underground water resources. Because there are no toilet facilities, their solid wastes pollute the environment.

Finally, Asia remains polluted and environmentally degraded because of its concern for growth. The environmental Kuznet's curve says that as poor nations grow, they will pollute and degrade the environment at a faster rate than they can restrain pollution and degradation. Telling poor people to restrain their rate of growth is not the solution. India cannot afford to have a growth rate of less than 8%. There was a time when India registered a growth rate of 3.5% a year in GDP, derisively referred to as the Hindu rate of growth. Today, we cannot afford a growth rate of less than 8% as this growth rate alone will throw up 8 million jobs a year, though almost 10 million people come into the Indian job market every year. It is because of higher growth that states such as Goa and Tamil Nadu have shown the fastest spread of literacy, and population growth rates have dramatically fallen in these states. In Kerala, for example, it has been established that there is a one-to-one correlation between female literacy and low birth rates. Much of this may be put down to rapid economic growth. Rapid economic growth will indeed pollute the environment further, will indeed degrade the environment more before the Kuznet's curve, if it is valid, takes over, and pollution is restrained and degradation controlled.

India and most South Asian countries are today at a stage where growth is an imperative, but carries with it a high cost. Without sustained growth at the rate of 8%, these countries are politically unviable. If there is no growth, we will not have a civil society in these countries after 10–20 years. If the number of poor people in India alone is 300–400 million and likely to rise to 500 million by 2025, there is no use telling South Asian countries, or India particularly, to not to grow at a rate that is imperative.

Pakistan faces a similar problem, being in a worse position today than it was 10 years ago in terms of economic development. Many of the states of South Asia are today classified as failed—unable to grow, unable to sustain growth, and unable to deliver. We are caught in a Catch 22 situation. Growth will exact a price, but without growth we will pay a much larger price in terms of maintaining civil society, remaining politically viable, and remaining one nation or one state. I, therefore, request scientists, industries, governments, and leaders of civil society to look at the problem from the point of view of a poor country and a poor citizen. Yesterday, I visited a poor district of Tamil Nadu rain-fed, the crop mostly paddy or sugarcane, with virtually no off-farm employment for about six months a year. Children are enrolled in schools, but girls begin to drop out when they reach the age of five, the boys begin to drop out when they reach Class VIII, and 75% of the children drop out before Class X. They have acquired very few skills, certainly not skills that can give them mobility in the labour country, not skills that can give them a job or even self-employment. There are many such districts in India, a large number in Bihar, Uttar Pradesh, Rajasthan, and Orissa. I am sure there are many such districts in Pakistan and Bangladesh as well. I see women forced to answer calls of nature before sunrise or after sunset. I see farmers digging deeper and deeper to exploit groundwater resources, because the state cannot provide them protected water. I see children and women trekking 3–4 km to cut firewood because there is no electricity. To such people, sustainable development will have meaning only after we assure them a certain level of dignified existence, after some basic needs are met. According to the figures of Asia's per capita income, today and 25 years later, Hong Kong and

Singapore are and will be at the top, and Pakistan, India, Bangladesh right at the bottom with only Papua New Guinea below us.

In terms of purchasing power parity, the most populous states of South Asia have a per capita income of 1000 dollars today. In 25 years this will rise to 5000 dollars, whereas Hong Kong and Singapore would have reached 35 000 dollars. But this will still not be enough to meet the basic needs of a vast majority of people. So at the end of 25 years, even if we grow at moderate rates of 6%–7%, the bulk of the population of these countries will remain extremely poor. And being poor, living in a poor country, they will be forced to do things that continue to pollute and degrade the environment. The solution is to accelerate growth in the short run and meet the basic needs of these poor people so that they can understand what sustainable development is.

Valedictory session

I K Gujral, Hon'ble former Prime Minister of India

Sheila Dikshit, Hon'ble Chief Minister of Delhi, India

Ola Ullsten, Hon'ble former Prime Minister of Sweden

R K Pachauri, Director-General, TERI

Valedictory session

Chairperson's remarks

I K Gujral
The Hon'ble former Prime Minister of India, New Delhi, India

Poverty: the global challenge for governments, industry, scientists, and civil society 205–208

The last century has seen unprecedented levels of development in terms of global wealth, global connections, and technological innovations. However, also a reality are 2.8 billion people living below the poverty line. So is malnourishment with 50% of children in poor countries falling into this category. More statistics reveal nutritional deficiencies, natural resource degradation, illiteracy, gender apartheid, and discrimination against communities.

Defining poverty today has gone beyond taking only income into consideration. It is the lack of choices and the absence of hopes that define poverty. Nobel laureate Amartya Sen defines it as deprivation of basic capabilities, which can be reflected in premature mortality, significant undernourishment, persistent morbidity, widespread illiteracy, and other failures. Such parameters, when taken into consideration, reveal an even darker picture than what appears at the outset. The Human Development Reports persist in pointing out how the absence of human governance cause and sustain such social realities.

The severe earthquake that took place on 26 January in Gujarat has brought with it not only unprecedented loss of life and property, but also shattered the very fabric of society. And though all, irrespective of their income and other social assets, are sufferers, the worst sufferers are the poor. The poor only have nature as a significant source of capital; such calamities take away this source as well.

This confronts us with an embarrassing question 'How can we justify such a situation?' It forces us to look back and apply the needed correctives to the system as a whole. It is no more fashionable to talk of 'socialism'. All the same, the demands of social equity and social justice, by whatever name these are called, are such as should make the policy makers revise the economic models to bring the poor into the mainstream of development. As Ambassador Walter Fust pointed out, sustainable development is really about a few fundamental principles of equity, sufficient economic means of living, and a clean environment. The technological developments of the past century have provided us with just the right opportunity to make sustainable development a reality.

There have been massive developments in agricultural technologies. These are particularly significant for developing countries such as India. The World Bank estimates that between 1990 and 2030, the world's population will grow by 3.7 billion people, 90% of whom will be in the developing countries where the infrastructure for the production of food is most at risk. We hear of the successful stories from concepts such as integrated crop management. India must move from food security to nutritional security. This has enormous relevance when one considers the millions dying of malnutrition worldwide, when the food godowns are full to the brim. This is both an agony and a paradox. But given the current debate about the long-term impacts of GMOs (genetically modified organisms), do we have another choice? In this context, Lawrence S Bacow suggests the globalization of food production as a potential solution to the problem as it will result in the elimination of non-sustainable agricultural practices. On the long-term basis, globalization of food production may have some relevance only if enough safeguards are provided for the growth and development in countries like India that are threatened by adversarial effects of globalization associated with problems of inadequate finances. The increasing rural–urban migration and large scale unemployment of the rural landless pose grave challenges. We have therefore to create additional employment opportunities in rural areas before we displace farm labour.

Research and development of renewable energy provides a promising picture. They take care not only of the environment but also reduce our dependence on sources that are expensive and fast-depleting. Biomass remains the most common form of energy among the poor in developing countries who require sustainable and efficient fuel systems that lift the pressure from such sources. Energy-efficient devices for conversion and use of biomass can help particularly the poor who have no other option except the added use of wood and coal that adversely affect the environment. Energy-efficient solutions addressing the needs of the poor are gaining wide popularity and though there have been problems in their implementation, by and large the promise of these technologies has been impressive.

Information technology has revolutionized the whole world. The keyword today is speed and fast access. Information flows today have reached unprecedented levels. We have some shining examples like that of the Grameen Bank in Bangladesh that has demonstrated how villages can be connected with cellular phones. There are many examples in the Indian context that can be hailed as success stories in this field. But what we require are initiatives at the national, and perhaps global level, that can serve as guiding strategies.

We are now talking about technologies that respect the environment. That in itself is exceedingly important to break the nexus between poverty, environment, and development. It is worth mentioning here that the issues pertaining to environmental degradation are continually discussed in many conferences where the Third World blames the industrialized countries and vice versa. However, this is no excuse for us all to escape responsibility. It becomes difficult to appreciate the reluctance on the part of the developed countries to ratify the Kyoto Protocol and help the world to combat the threat of climate change. In the Stockholm conference, I had pleaded for the creation of an international fund to fill the gap between the cost of polluting and non-polluting technologies, but it remains unheeded. The poorer countries are unable to afford the changeovers to non-polluting technologies. We see this happening in every city of India. Forced by an order of the Supreme Court, a few thousand polluting units are being closed in Delhi. But that would not solve the problem. These will only shift to other locations where the environment will continue to get damaged. Unless the financial institutions help, the real change will continue to evade us.

Now, the question of the agent. Given the numerous opportunities to attack the problem of poverty, who should be the agent of change? Poverty is really a global challenge. This problem has transcended national boundaries and calls for global responses. Collective action is bound to help achieve results. Everybody has a role to play in tackling this problem, be it governments, industry, scientists, or civil society. The international community plays a very important role because of globalization.

Globalization is a fact of today. What we need to do is investigate opportunities that can help us convert it into a major opportunity for poorer countries, and smaller enterprises. For this, as David Stanton says, we need to overcome the constraints of limited market information, inadequate training, poor market infrastructure, and outdated technology. He has also identified unfavourable policy, legal, and regulatory environments for enterprise, a lack of appropriate financial services, a shortage of management skill and business development services, insufficient market knowledge, poor communications and institutional linkages, as formidable constraints in developing countries on enterprise formation and expansion.

The governments, on their part, can ensure pro-poor economic growth, adequate provision in budgets for basic necessities such as health care and education, remove subsidies, adopt policies that account for the environment in statements about development, protect the environment, and ensure participative governance at all levels.

Scientists need to focus on technological developments that directly impact the poor.

Development agencies can develop a more favourable business environment, strengthen the retail capacity of micro-finance institutions and management and business development services, and improve market knowledge, communications and institutional linkages.

Global corporations cannot continue to serve only the elite. They must understand the social milieux of their locations. It becomes the duty of developing nations to provide them with such an understanding. After all, the poor, given their vast numbers, are a potential market once given the right products in terms of income-enhancing inputs.

What we require today are financing institutions that make poverty alleviation a direct objective of any funding that they provide. Such an approach will go a long way in tackling poverty. As Nick Robins has pointed out, socially responsible investment is already a fast-growing movement among fund managers in Europe and North America.

It is important to mention the requirement of a new framework of development cooperation. Such a framework would include not only development assistance but also trade, debt management, private investment and capital flows, private sector development, and access to technology. This framework should be a synergistic one that conjoins private sector development and the strengthening of civil society as a whole; and should take into account sustainable human development. There is a need to redefine the relationship between industrial and developing countries taking into account the common interests and complementary needs of the rich and the poor, as well as global goals forged through the United Nations. It is also important to have a framework in which development assistance is country-driven and not donor-driven. Development assistance needs to be seen not as an alternative to private investment but as an essential building block to a vibrant private sector and successful financial markets.

We must also remember the important role of the media in today's world. The electronic media has made a deep impact on minds and lifestyles. Their power reaches the farthest corners of the earth. It owes us the responsibility of access to correct information which serves as a check on governments and industries. It also bears the responsibility to build solidarity with the poor.

NGOs such as TERI are already doing their bit in terms of providing governments with solutions to problems ranging from climate change to participatory resource management. I thank them for this help and service. Thus we see that almost all entities important in this age can contribute towards tackling this problem.

Valedictory session

Panellist's remarks

Sheila Dikshit
Hon'ble Chief Minister of Delhi, New Delhi, India

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As somebody who has been put in charge of Delhi, let me welcome all of you here very warmly. Though the summit is at its end, I do hope you had a fruitful stay and equally fruitful discussions.

When people of my time grew up, I do not think there was anything called the environment, pollution or sustainable development; these are words that have been added on as life has progressed, as the world has progressed, and as science has progressed. Sustainable development is the latest to be added to what we seem worried about and what we wanted to talk about. Mr Gujral has put into focus what people in India think about development and sustainable development. We are at a stage where we have an extremely large population; where the differences between the rich and the poor are enormous; and where there are large differences between those with opportunities and those with talents. So, for us, sustainable development would primarily mean development which is natural and which meets everybody's needs rather than catering to a few.

Mr Gujral spoke of Delhi, and it is a particularly good example: how do you sustain Delhi and its development? Delhi has a large population of 14 million people, and half a million people are added to it every year. One million people come to work in Delhi every day and go back. Four million people live in the slums and three million people live in areas called 'unauthorized areas', with barely proper sanitation. So, we have seven million people living in near-subhuman conditions. The rest live in more or less comfortable even in crowded surroundings. We also have disparities: in one area of Delhi the per capita consumption of water is 463 litres a day and, barely 20 kilometres away, it trickles down to 32 litres. In Delhi, growing affluence and the rise of industry have jointly more or less killed whatever agricultural base or surrounding greenery it had.

When we spoke of emulating the Japanese model, the belief that every house should be an industry was encouraged. Delhi became—like one or two other cities in northern India and two in Punjab—a city where practically every household had an industry or started one. This happened in the 1960s and 1970s and by the 1980s, Delhi had already begun to grow at a pace faster than either its government or its civic bodies could cope with. Therefore, everything fell short, even basic necessities—electricity, water, roads. But Delhi still keeps attracting people, because it has the highest per capita income in the country, and also has the highest wages in the country. I have yet to meet either a civil servant or a politician who comes to Delhi on work and goes back. They all come only to settle down.

This attractiveness has become a problem: nobody wants to leave Delhi because of its comforts. With the annual increases in population, we are not going to be able to sustain this pace or standard of living for long. In spite of all the nice things that can be said about Delhi, it is an island of great deprivation and poverty. Even lepers come from neighbouring states to stay here and their population has grown tenfold over the last five or six years, primarily because they find a livelihood here. They manage to get at least one square meal and manage to live in some dignity because they are ignored.

So, what is growth, what is development, and what does it bring along with it? Will nature be able to sustain this kind of growth? India has a large land mass, but can it sustain this rapid growth in population?

We are told that we are the best destination for information technology. We produce the most talented, the most well-versed engineers in information technology in the cheapest of ways. But what happens then? These young people are attracted by wonderfully big pay packets to so many nooks and corners of the world. What this nation puts into its students it does not get back. Now, is that sustainable? We are proud to have developed such institutions, to produce such brilliant minds. But having produced them, having trained them, what have they given back to the development of this nation? We are producing food, enough food, and yet there are people who, as Mr Gujral pointed out, still go hungry. Now these are the concerns, these are the issues.

We use a lot of plastics, which is against the laws of nature. Plastics do not adhere to the philosophy of the cycle of life, returning to the earth what is born from it. I am speaking to you more as a concerned citizen, as a commoner who thinks about these things and worries about them. Conferences such as this one, where we talk of a concern for development, are necessary because they also talk of results.

I am sure most of you here know that Bhutan has taken a lead; it has started using as its development parameters not economic affluence or per capita income but human happiness, human satisfaction. Even though Bhutan is a tiny country, tucked away in the Himalayas, I think it has taken a lead. Each one of us, somewhere inside, is worried. Does development mean only economic development, or does it mean the wholesome development of a people, of a society, of a family, of a human being?

Valedictory session

Panellist's remarks

Ola Ullsten
The Hon'ble former Prime Minister of Sweden

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Politics of the environment: a discussion paper

Why is it that when there is evidence all around of our strained ecosystems, when we have an abundance of knowledge of what causes the stress on our resources, when there is compelling evidence that lack of drastic action could lead to disastrous consequences, and when international agreements and high-level political statements seem to underscore the seriousness of the situation, we still keep ignoring our own warnings, disregarding even undisputed facts about the declining environment and thereby continue to contribute to problems rather than taking the action needed to turn the trends?

The two pictures

Picture one

Much publicized national legislation and international agreements, successful projects in many areas, reported reduction in air pollution, environmentally motivated changes in industrial procedures, improved waste management, growing awareness among ordinary citizens and far-reaching commitments from leaders in government and business, etc.

Picture two

A steady stream of scientific and other reports on loss of forests and arable land, sinking ground water tables, crowded and polluted mega cities, depletion of fisheries and dying oceans.

The small picture of pro-environment activities seems to have little or no effect on the big picture of an ongoing and rapid deterioration of all our natural resources.

Two kinds of solutions

The means to combat environmental degradation can be divided into two categories—technical solutions and structural reforms.

Examples of technical solutions are planting trees to combat deforestation, establishing protected forest areas to preserve biodiversity, removing lead from gasoline to minimize air pollution, treating poisonous waste to protect the quality of groundwater, and prohibiting the use of certain chemicals in farming and industry.

Examples of structural reforms are removing subsidies and tax incentives that make forest-clearing more profitable than forest preservation; using the price mechanism to control the use of products that, by the way they are produced or used, threaten ecological health; planning cities with the aim of reducing the use of private vehicles; institutional reforms that enable people to take a more active part in decision-making on environmental matters; and teaching a new ethics.

The theory of sustainability

Sustainable development is a strategy for generating resources at the same time as it cures or avoids further destruction of the environment. As a theory, sustainable development does not rest on any trade-off between development efforts and efforts to protect the environment. It is a win-win strategy to organize our societies so that we will have neither social nor economic or environmental deficiencies. Focusing on how to achieve this strategy in practical terms will test the validity of the theory of sustainability. Achieving the win-win phase of sustainable development entails accepting the full costs of changing current policies and practices. Neither political leaders nor the electorate have so far shown much of a willingness to do that. Hitherto, policy changes seem to have been focusing on reforms that demand the least possible adjustment in the current way of doing things.

The process of change

We are not causing environmental destruction out of ill will but because it is an unintended result of values, priorities, and behaviours that have become part of our political culture. Guided by existing values and available choices, we want to do what is best for ourselves. The landless Brazilian shifting cultivator has no other choice than to clear a piece of forest, use the land for farming as long as the soil remains fertile enough to produce a crop, and then move on to the next site. The Canadian suburbanites have lots of choices and typically choose to consume as much as their economic situation tolerates because this makes them feel good. And since this is good for the economy of the country as well, a range of suitable economic and other incentives support his behaviour. Sustainability would require that we improve the conditions for the shifting cultivators through land reforms and refrain from building logging roads into the forest—all of which would challenge those Brazilians who benefit from the status quo. The Canadians would have to redefine progress to mean more than material good and take into account an integrated approach to the world's ecological health. As in the Brazilian case, this would require equally unpopular and politically initiated structural changes, implying a different set of economic priorities.

The politics of plenty and poverty

In the industrialized world, politics in the late 19th and the 20th centuries has been about how to distribute a growing wealth created through an input of human skills and labour, financial capital, and an unlimited access to natural resources. In today's so-called Third World (or the developing countries) politics is about battling with unprecedented poverty among populations that are growing at a rate unknown to the history of humankind. People in rich countries are guided by a politics of plenty; we are caught in an ever-more-never-enough syndrome. The notion that the prevailing pattern of consumption might undermine the lifestyle it has produced is hardly a concern in policy planning anywhere. For developing countries, it is a matter of meeting immediate needs for survival and not much thought is given to long-term environmental considerations.

The fear of change

Hitherto, the adoption of more environmentally friendly policies has, with few exceptions, been about technical solutions rather than structural reform. Principles like 'polluters pay' have been adopted but implemented only with great caution. This is not because governments and businesses are unfamiliar with structural changes. For example, forced by international competition, unions, corporate leaders, and governments have in many cases successfully been able to reallocate or replace whole branches of industry. Failure to do so would have resulted in immediate and severe losses of income and employment for people, revenues for the government, and profit for business. The fragility of our ecosystems causes a much more severe threat to humankind than the volatility of markets. The difference is that the consequences of non-action in dealing with environmental threats would not come soon but in a far away future.

The three schools

There are fundamental differences on how to approach the problem of a declining environment. Constanca et al. (1999) identify two schools in the intellectual and political debate: the 'technological optimists' (new technology will solve all the problems, so don't worry) and 'the skeptics' (those who are less optimistic and recommend policies that err on the side of caution). One could add a third category, the 'ecological romantics', who would rather see humans leaving behind no footprints at all on planet earth. The optimists and the romantics both present scenarios that require little or no action while the 'skeptics' in the middle have the more difficult task of explaining why technological development and economic growth should be looked upon as means rather than aims in themselves. Governments usually find it more convenient to listen to the optimists.

The full-world concept

There is a reason why the optimists may be wrong this time. The economist Herman Daly talks about a full world as opposed to an empty world—a world full of people where natural resources are being overexploited, as opposed to a world with a small population and resources rich enough to withstand human demands without losing their self-generative capacity. This gives us reason to redefine the present direction of development. We have to add a new component to our understanding of a welfare state. It is not only about social and economic standards any more: it is also about ecological health. This is what is new in our world. It takes more than step-by-step technical changes to move from that observation to a new way of thinking the building of societies—it takes a grand strategy based on a new definition of the welfare state.

The six recognitions

The following summary observations (referred to as recognitions) drawn from the nine sections above should be viewed as some kind of raw material for possible conclusions.

Recognition 1

There is a decisive gap between what we know can be done and what we do to protect the world's threatened ecosystems. The obstacles are not a lack of science, technology, or financial resources but political inertia.

Recognition 2

As a theory, sustainable development is a win-win strategy that generates resources at the same time as it protects the environment. It will have to be recognized, though, that getting there means a trade-off between environment and development.

Recognition 3

Although commendable as such, technical solutions with little or no impact on global trends of declining resources may at worst serve as an excuse for dodging the structural reform needed to curb those trends.

Recognition 4

Since human behaviour destructive to the environment is usually caused by economic incentives for citizens to act that way, changing those incentives should be at the core of any government's environment policies.

Recognition 5

Changing the big picture of negative global trends justifies international institutions with supranational power acting in combination with local institutions to enable citizens to be actively involved in planning and decision-making on environmental matters.

Recognition 6

It should be recognized that a world that is full of people and losing its natural resources is experiencing a crisis that justifies extraordinary measures. It takes a new definition of the welfare state that includes ecological health and a grand strategy to induce new thinking on the building of societies.

the negotiations since Rio and, particularly since the Kyoto protocol was agreed on, nothing gets done; there will then be very little hope for any kind of international understanding.

Climate change and its mitigation require actions in the energy sector which are central to the challenge of tackling poverty in the future. This is where the developed countries must lead; they owe this to themselves and to the rest of the world. A reference was made earlier to the role of innovation and the outcome of this conference. We are going to launch a programme, called INSTEP (Integrating New and Sustainable Technologies for Elimination of Poverty). The programme will aim to integrate information technology, renewable energy technology, biotechnology for agriculture, and other enterprise-related technology and innovations for the benefit of rural areas in particular and, of course, even the urban poor. We hope to launch this at the grassroots level in India. TERI is involved in solving rural energy problems on a large scale but we want to multiply and expand this effort by joining hands with our partners. We are also the Secretariat of the Asian Energy Institute, the members of which are all located in Asian countries; we will work with them to bring about this new innovation in poverty elimination in the rural areas of Asia, and perhaps with partners in Africa as well. We have ambitions of trying to raise at least ten million dollars to make this happen, because there is no point in putting in a sub-critical effort; if we want to be effective, we have to do it on a large scale and on a diverse platform whereby we can learn about the role of technologies in the twenty-first century, and about how to bring about technological innovations in the rural areas for the benefit of the poor. We will seek partnerships and ideas, and will be writing to several of you for these. Please feel free to volunteer your advice and views on how we might move ahead.

It is now left for me to offer a final vote of thanks. I am very grateful to our Hon'ble former Prime Minister, Shri I K Gujral, for being with us. He has always been a source of inspiration to us: I cannot think of anyone else who has maintained such a high level of intellectual activity in such a diverse range of subjects as he has. I was so proud when I was teaching at Yale last semester to find that you, Sir, had come to deliver a talk and that your audience spilled out of the building, and that the reviews were rave.

The Hon'ble former Prime Minister of Sweden, Mr Ola Ullsten, has become a friend and a supporter of this initiative and I hope we can count on his support in the future. His insights into issues of sustainable development and his stewardship of the initiative to bring about reforms in the forestry sector throughout the world are enriching gems of experience we will continue to count upon.

I am indeed grateful to Mrs Sheila Dikshit, the Hon'ble Chief Minister of Delhi. One knows the pressures on her time, but I must also express my admiration at the cool manner in which she handles all kinds of emergencies. I also look forward to her support because we want Delhi to become the major platform from which a powerful message must go out on the path to sustainable development for the world as a whole.

I would like to thank all our sponsors: Tata Sons in particular, and all the other partners who have joined hands with us in this venture. I would like to thank all my colleagues for having put in a great effort in making this conference what it has been, particularly when I was away for about three and a half months. And last but not the least, I would like to thank the speakers, the chairpersons for the sessions, and all of you, ladies and gentlemen, for being with us and for having contributed to the proceedings. We hope to see you next year; until then, thank you and goodbye.

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The annual DSDS (Delhi Sustainable Development Summit) is a landmark forum, perhaps the only one of its kind hosted in the developing world, that brings together universally respected policy-makers, corporate executives, researchers, financial experts, diplomats, academics, activists, and mediapersons to discuss issues pertinent to global sustainable development and human future.

DSDS 2001 (7–9 February 2001) dealt with *Poverty: the global challenge for governments, industry, scientists, and civil society*. An estimated 2.8 billion people still live at incomes below 2 dollars a day; a situation of such daunting poverty that severely constrains choices, results in vulnerability, and perpetuates inequities. DSDS 2001 recommended that feasible solutions be swiftly devised by governments, corporates, civil society, and innovators of science and technology in synergy. It is also crucial to ensure that the rich do not impose a footprint on the earth's ecosystem larger than their share and that the poor lift themselves out of poverty using environmental services sustainably.

Deliberations and discussions at DSDS 2001 provided intellectual stimulus and attracted considerable media attention. The addresses by Mr Maurice Strong (President, University for Peace, Costa Rica), Nobel laureate Prof. Paul Crutzen (Director, Max Planck Institute for Chemistry, Germany), Mr I K Gujral (former Prime Minister of India), and Mr Ola Ullsten (former Prime Minister of Sweden) were inspiring and thought-provoking.

This document contains a detailed chronological account of the Summit proceedings, including keynote addresses, inaugural, plenary, and valedictory sessions, and lunch and dinner speeches.

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